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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

Applicant: **GOOGLE LLC** 

1600 Amphitheatre Parkway Mountain View, CA 94043

**Product Name:** Wireless Streaming Device

**Brand Name:** Google Model No.: G3AL9 **Model Difference:** N/A

**Report Number:** ER/2020/80015 FCC ID: A4RG3AL9

**FCC Rule Part:** §15.407, Cat: NII **Issue Date:** Dec. 08, 2020

**Date of Test:** Aug. 06, 2020 ~ Sep. 25, 2020

Date of EUT Received: Aug. 06, 2020

## We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10: 2013 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Approved By:

Blue Yang / Asst. Manager

Mlen Tay





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Revision History					
Report Number	Revision	Description	Issue Date	Remark	
ER/2020/80015	Rev.00	Original.	Dec. 08, 2020	Revised By: Tiffany Kao	

### Note:

1 · Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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## **GENERAL INFORMATION**

## **Product Description**

Product Name:	Wireless Streaming Device
Brand Name:	Google
Model No.:	G3AL9
Model Difference:	N/A
Hardware Version:	N/A
Software Version:	N/A
Power Supply:	3.65Vdc from Rechargeable Li-polymer Battery or 5V from AC/DC Adapter
Modulation type	64QAM, 16QAM, QPSK, BPSK for OFDM
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 72.2Mbps

### 1.2 **Antenna Designation**

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Peak An- tenna Gain (dBi)	Worst An- tenna Gain
		N/A	5150~5250	5.9	-
PIFA N/A	NI/A		5250~5350	5.9	-
	IN/A		5470~5725	6.5	-
			5725~5850	6.6	-

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#### 1.3 **FCC** worst power

Wi-Fi	Frequency	Channels	Rated Power (Avg.)	Modulation
802.11	Range		(dBm) (Worst case)	Technology
	5150~5250	4	15.48	
	5250~5350	4	15.47	OFDM
а	5470~5725	12	15.44	OFDIVI
	5725~5850	5	15.38	
	5150~5250	4	HT: 15.46	
n_HT	5250~5350	4	HT: 15.49	OFDM
20M	5470~5725	12	HT: 15.47	OFDIVI
	5725~5850	5	HT: 15.49	

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### 1.4 **Test Methodology of Applied Standards**

FCC Part 15, Subpart E §15.407

FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10:2013

### 1.5 **Test Facility**

SGS Taiwan Ltd. Central RF Lab (TAF code 3702) No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

FCC Designation number: TW0027

### 1.6 **Special Accessories**

There are no special accessories used while test was conducted.

### 1.7 **Equipment Modifications**

There was no modification incorporated into the EUT.

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## SYSTEM TEST CONFIGURATION

### 2.1 **EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### 2.2 **EUT Exercise**

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

#### 2.3 **Test Procedure**

#### 2.3.1 Conducted Emissions

The EUT is a placed on a table which is 0.8 m above ground plane. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz. The CISPR Quasi-Peak and Average detector mode is employed. The two LISNs provide 50uH/50 ohm of coupling impedance for the measuring instrument. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

### **Conducted Test (RF)** 2.3.2

The active antenna port of the unlicensed wireless device is connected to the spectrum analyzer with attenuator to protect the instrumentation. If a second antenna port is available, it is tested at one operating frequency, with other port(s) appropriately terminated, to verify it has similar output characteristics as the fully tested port.

#### 2.3.3 **Radiated Emissions**

The EUT is a placed on a turn table. For emissions testing at or below 1 GHz, the table height shall be 0.8 m above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.

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#### 2.4 **Measurement Results Explanation Example**

#### Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz 2.4.1

Radiated emission below 30MHz is measured in a 9m\*9m\*6m semi-anechoic chamber. the measurements correspond to those obtained at an open-field test site. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

#### 2.4.2 For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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### 2.5 **Configuration of Tested System**

Fig. 2-1 Radiated Emission Configuration



Fig. 2-3 Conducted (AC powerline) **Emission Configuration** 

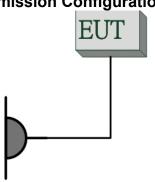


Fig. 2-2 Conducted (Antenna Port) Emission Configuration

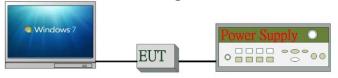


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	WLAN 5G Test software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	T440P	PC-014TAK	N/A	N/A
3.	DC Power Supply	Agilent	E3640A	MY40000811	N/A	N/A

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## SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(i) §15.407(e)	26 dB & 6dB Emission Bandwidth	Compliant
§15.407(a)	Maximum Conducted Output Power	Compliant
§15.407(a)	Power Spectral Density	Compliant
§15.205 §15.209 §15.407(b)	Undesirable Radiated Emissions	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.203 §15.407(a)	Antenna Requirement	Compliant

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## **DESCRIPTION OF TEST MODES**

### 4.1 802.11a/n operated in U-NII Bands

## Operated band in 5150 MHz ~5250 MHz:

20 M			
СН	Freq		
011	(MHz)		
36	5180		
40	5200		
44	5220		
48	5240		

## Operated band in 5250 MHz ~5350 MHz:

Operated b				
20 M				
СН	Freq			
G	(MHz)			
52	5260			
56	5280			
60	5300			
64	5320			

## Operated band in 5470 MHz ~5725 MHz:

20 M				
СН	Freq (MHz)			
100	5500			
104	5520			
108	5540			
112	5560			
116	5580			
120	5600			
124	5620			
128	5640			
132	5660			
136	5680			
140	5700			

## Operated band in 5745 MHz ~5850 MHz:

20 M			
СН	Freq (MHz)		
149	5745		
153	5765		
157	5785		
161	5805		
165	5825		

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#### 4.2 The Worst Test Modes and Channel Details

- The EUT has been tested under operating condition.
- 2. Test program used to control the EUT for staying in continuous transmitting mode is programmed.
- 3. Investigation has been done on all the possible configurations for searching the worst case. The gevin UE is pre-scanned among below modes.

Modulation	Transmission Chain			Multiple Transmission Spatial	
⊠ 802.11 a	⊠ Ch0	⊠ Ch1	□ Ch2	☐ Ch3	□ 2TX
⊠ 802.11 n	⊠ Ch0	⊠ Ch1	☐ Ch2	□ Ch3	☐ MIMO

4. Therefore, below summary is the modes of test configuration that yield the highest reading and generate the highest emission chosen to carry out the relevantly mandatory test items.

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#### 4.2.1 **RADIATED EMISSION TEST:**

RADIATED EMISSION TEST (BELOW 1 GHz)						
MODE	FREQUENCY BAND (MHz)		TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN- TENNA PORT
	5180~5240	36 to 48	44			
802.11a	5260~5320	52 to 64	60	OFDM	6	Ch0
002.11a	5500~5700	100 to 140	116	OFDIVI	0	Cito
	5745~5825	149 to 165	157			

RADIATED EMISSION TEST (ABOVE 1 GHz)						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN- TENNA PORT
	5180~5240	36 to 48	36,44,48			
802.11a	5260~5320	52 to 64	52,60,64		6	Ch0
002.118	5500~5700	100 to 140	100,116,140			
	5745~5825	149 to 165	149,157,165	OFDM		
	5180~5240	36 to 48	36,44,48	OFDIVI		
000 11n UT00	5260~5320	52 to 64	52,60,64		MCS0	ChO
802.11n_HT20	5500~5700	100 to 140	100,116,140		IVICSU	Ch0
	5745~5825	149 to 165	149,157,165			

### Note:

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for 802.11a/n/ac WLAN Transmitter for channel Low, Mid and High, the worst case H position was reported.

#### 4.2.2 ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST						
MODE	FREQUENCY BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)	AN- TENNA PORT
	5180~5240	36 to 48	36,44,48			
802.11a	5260~5320	52 to 64	52,60,64		6	Ch0
002.114	5500~5700	100 to 140	100,116,140		0	
	5745~5825	149 to 165	149,157,165	OFDM		
	5180~5240	36 to 48	36,44,48	OFDIVI		
902 11n UT20	5260~5320	52 to 64	52,60,64		MCS0	ChO
802.11n_HT20	5500~5700	100 to 140	100,116,140		IVICSU	Ch0
	5745~5825	149 to 165	149,157,165			

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## **MEASUREMENT UNCERTAINTY**

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
26dB & 6dB Emission Bandwidth	+/- 123.36 Hz
The Maximum Output Power Meas- urement	+/- 0.96 dB
Peak Power Spectral Density Meas- urement	+/- 1.67 dB
Frequency Stability	+/- 123.36 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

Radiated Spurious Emission Measurement Uncertainty			
	9kHz~30MHz: +-2.3dB		
	30MHz - 180MHz: +/- 3.37dB		
Polarization: Vertical	180MHz -417MHz: +/- 3.19dB		
Polarization. Vertical	0.417GHz-1GHz: +/- 3.19dB		
	1GHz - 18GHz: +/- 4.04dB		
	18GHz - 40GHz: +/- 4.04dB		
	9kHz~30MHz: +-2.3dB		
	30MHz - 167MHz: +/- 4.22dB		
Polarization: Horizontal	167MHz -500MHz: +/- 3.44dB		
Polarization. Horizontal	0.5GHz-1GHz: +/- 3.39dB		
	1GHz - 18GHz: +/- 4.08dB		
	18GHz - 40GHz: +/- 4.08dB		

### Note:

- 1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
- 2. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

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## CONDUCTED EMISSION TEST

## Standard Applicable

Frequency range within 150 kHz to 30 MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)		
MHz	Quasi-peak	Average	
0.15 to 0.50	66 to 56	56 to 46	
0.50 to 5	56	46	
5 to 30	60	50	

### Note

### 6.2 **Measurement Equipment Used**

Conducted Emission Test Site						
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.	
EMI Test Receiver	R&S	ESCI 7	100759	07/13/2020	07/12/2021	
LISN	SCHWARZBECK	NSLK 8127	8127-465	04/09/2020	04/08/2021	
Coaxial Cables	N/A	Coaxial Cable	161207	12/07/2019	12/06/2020	
Test Software	audix	e3	Ver. 6.11- 20180413	N.C.R	N.C.R	

#### 6.3 **EUT Setup**

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.10:2013.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The LISN was connected with 120Vac/60Hz power source.

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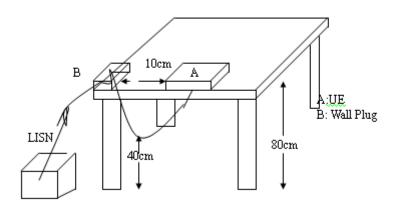
<sup>1.</sup> The lower limit shall apply at the transition frequencies

<sup>2.</sup> The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50



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### **Test SET-UP** 6.4



### 6.5 **Measurement Procedure**

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all phases of power being supplied by given UE are completed.

#### **Measurement Result** 6.6

Note: Refer to next page for measurement data and plots.

Note2: The \* reveals the worst-case results that closet to the limit.

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## AC POWER LINE CONDUCTED EMISSION TEST DATA

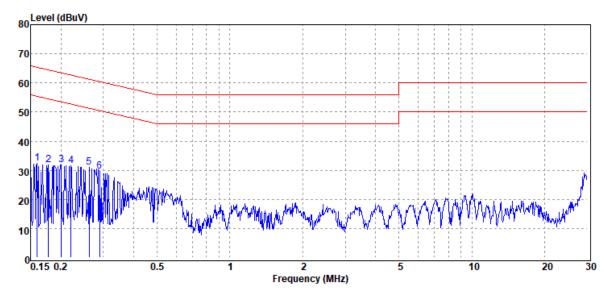
Report Number :ER-2020-80015 **Test Site** :Conduction 6F

**Test Date** :WLAN 5G :2020-08-10 Test Mode

:AC 120V/60Hz Temp./Humi. :26.2/53 Power

Probe :L Engineer :Nick

Note:



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV	dΒμV	dB
0.16	Peak	30.24	2.14	32.38	65.47	-33.09
0.18	Peak	29.59	2.14	31.73	64.59	-32.86
0.20	Peak	29.61	2.14	31.75	63.58	-31.83
0.22	Peak	29.30	2.14	31.44	62.79	-31.35
0.26	Peak	28.79	2.14	30.93	61.38	-30.45
0.29	Peak	27.57	2.15	29.72	60.54	-30.82

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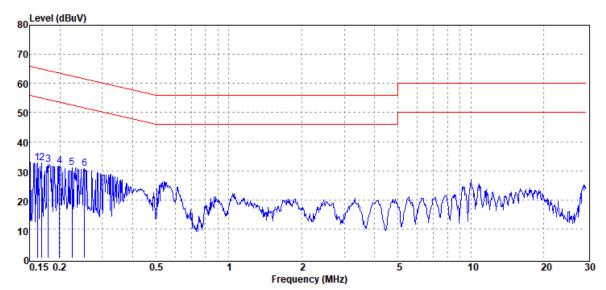
Report Number **Test Site** :Conduction 6F :ER-2020-80015

**Test Mode** :WLAN 5G :2020-08-10 **Test Date** 

:AC 120V/60Hz Power Temp./Humi. :26.2/53

Probe :N Engineer :Nick

Note:



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit	Margin
MHz	PK/QP/AV	dΒμ̈V	dB	dΒμV	dΒμV	dB
0.16	Peak	30.47	2.14	32.61	65.38	-32.77
0.17	Peak	30.66	2.14	32.80	65.03	-32.23
0.18	Peak	29.98	2.14	32.12	64.50	-32.38
0.20	Peak	29.47	2.14	31.61	63.62	-32.01
0.22	Peak	28.99	2.14	31.13	62.66	-31.53
0.25	Peak	28.58	2.14	30.72	61.64	-30.92

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## **DUTY CYCLE TEST SIGNAL**

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

### **Measurement Procedure:** 7.1

- 1. Set span = Zero
- 2. RBW = 8MHz
- 3. VBW = 8MHz,
- 4. Detector = Peak

**Duty Cycle:** 

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
802.11a	93.09	0.31	0.70	1.00
802.11n_20	92.78	0.33	0.75	1.00

Duty Cycle Factor: 10 \* log(1/0.9309) = 0.31 Duty Cycle Factor:  $10 * \log(1/0.9278) = 0.33$ 

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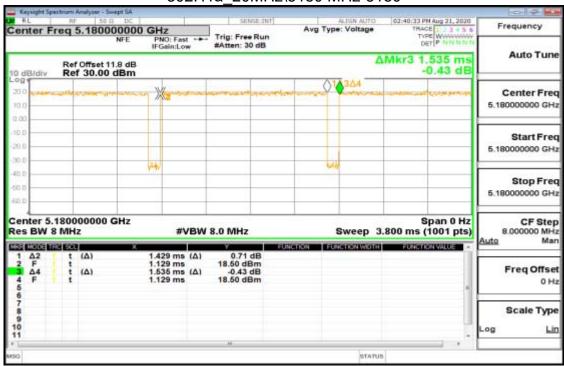
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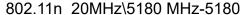


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## 7.2 DUTY CYCLE TEST SIGNAL MEASUREMENT RESULT

802.11a 20MHz\5180 MHz-5180







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### 26DB & 6DB EMISSION BANDWIDTH MEASUREMENT

#### Standard Applicable 8.1

There is no limit bandwidth for U-NII-1, U-NII-2-A and U-NII-2-C. The minimum of 6dB Bandwidth measurement is 0.5 MHz for U-NII-3

#### 8.2 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the Antenna port to the spectrum analyzer.
  - 3.a. 26dB Band width Measurement: Set the spectrum analyzer as 1% of emission BW Sweep=auto,

Detector = Peak,

Trace Mode = Max Hold.

Manually readjust RBW until the RBW/EBW ratio is 1% based on EBW as observed on the result of pre-sequence measurement.

- 3.b. Mark the peak frequency and -26dB (upper and lower) frequency.
- 4. Repeat the procedures as list above until all test default channels (low, middle, and high) are completed.
- 5. Minimum Emission Bandwidth for the band 5.725-5.850GHz.
  - a. Set the spectrum analyzer as

RBW = 100 kHz

VBW = 3\*RBW.

Span = 30M/50MHz,

Detector=Peak,

Sweep=auto

- b. Mark the peak frequency and -6dB (upper and lower) frequency.
- Repeat above procedures until all frequency of interest measured was complete.

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### 8.3 **Measurement Equipment Used**

SGS Conducted Room						
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021	
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020	
Temperature Chamber	TERCHY	MHG-120LF	911009	05/20/2020	05/19/2021	
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021	
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021	

### **Test Set-up** 8.4



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### 8.5 **Measurement Result**

#### 8.5.1 FCC 26dB Bandwidth

802.11a Ch0

002.118_0110				
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)		
5180	20.6	13.139		
5220	20.51	13.120		
5240	20.19	13.051		
5260	20.32	13.079		
5300	20.39	13.094		
5320	20.29	13.073		
5500	20.36	13.088		
5580	20.27	13.069		
5700	20.49	13.115		

802 11n HT20 Ch0

802.11n_H120_Cn0						
Freq. (MHz)	26dB BW (MHz)	10 Log (B) (dB)				
5180	20.66	13.151				
5220	21.1	13.243				
5240	20.63	13.145				
5260	20.7	13.160				
5300	20.36	13.088				
5320	20.54	13.126				
5500	20.86	13.193				
5580	20.64	13.147				
5700	20.49	13.115				

### 8.5.2 6dB Bandwidth (5725 MHz~ 5850 MHz) measure with Peak detector for FCC

802.11a\_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	14.45	11.599
5785	14.24	11.535
5825	14.96	11.749

802.11n\_HT20\_Ch0

Freq. (MHz)	6dB BW (MHz)	10 Log (B) (dB)
5745	16.69	12.225
5785	15.67	11.951
5825	11.3	10.531

#### 8.5.3 26dB BW Verification for DFS Function

802.11a\_Ch0

802.11n\_HT20\_Ch0

Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)	Freq. (MHz)	Measured Freq. (MHz)	Limit (MHz)
5240	5248.21	< 5250	5240	5248.80	< 5250
5745	5736.75	> 5725	5745	5736.15	> 5725

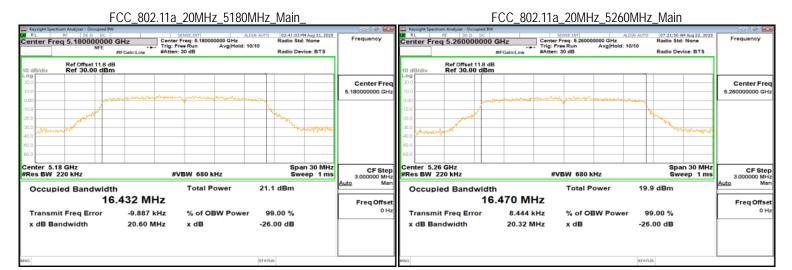
Please see next page for test plots.

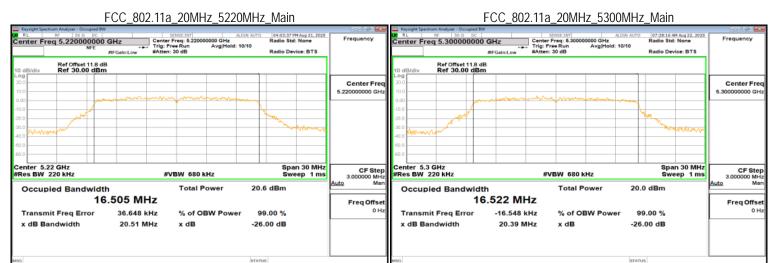
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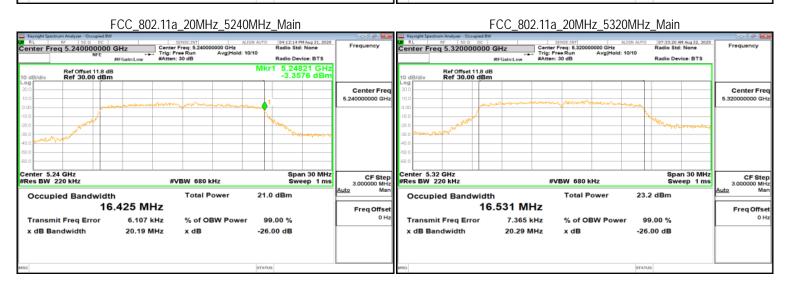
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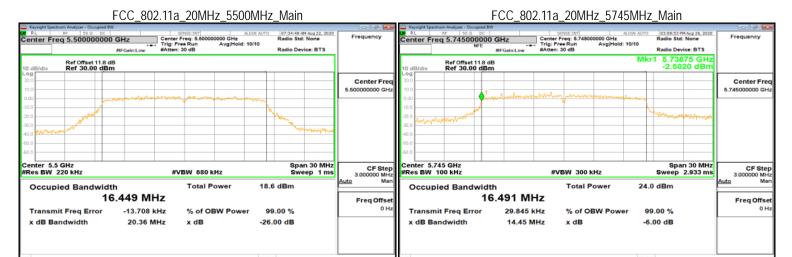
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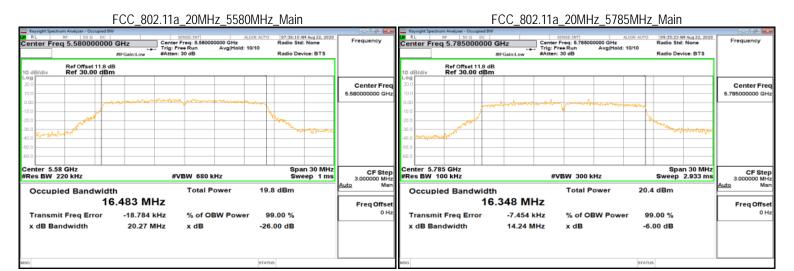
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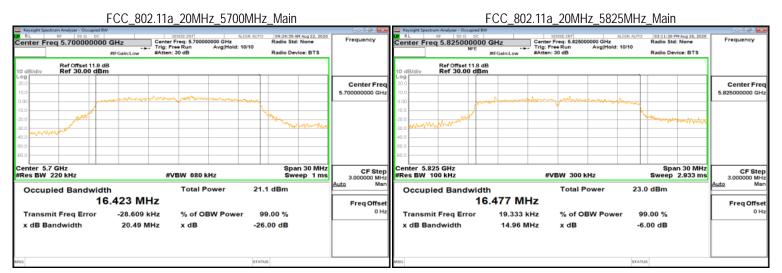
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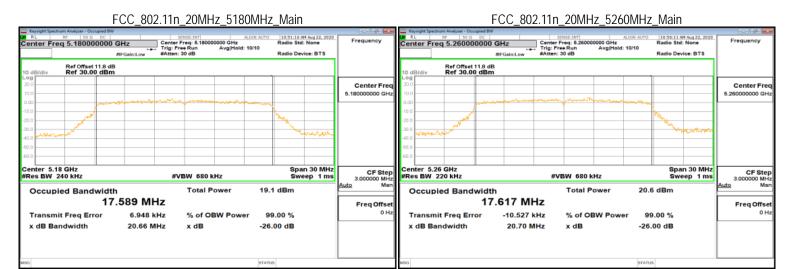
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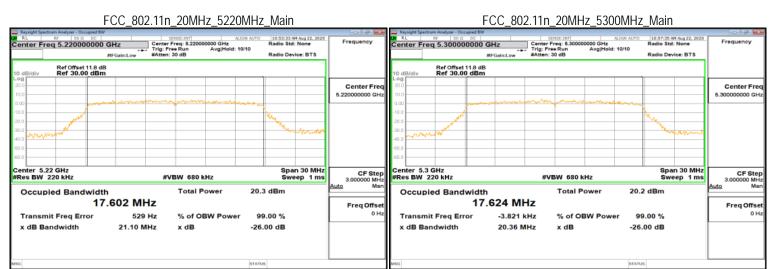
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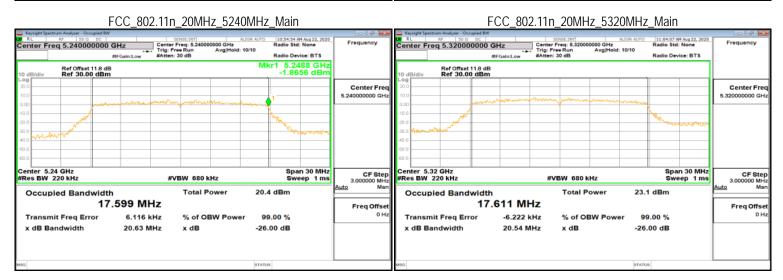
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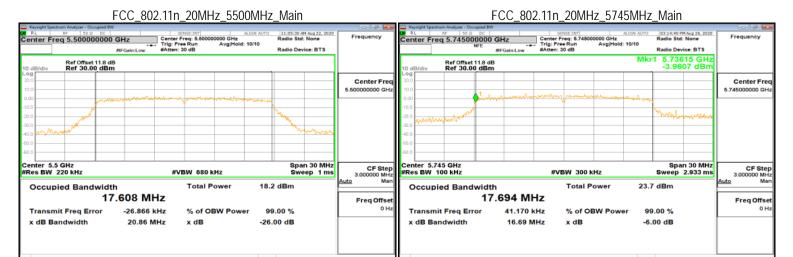
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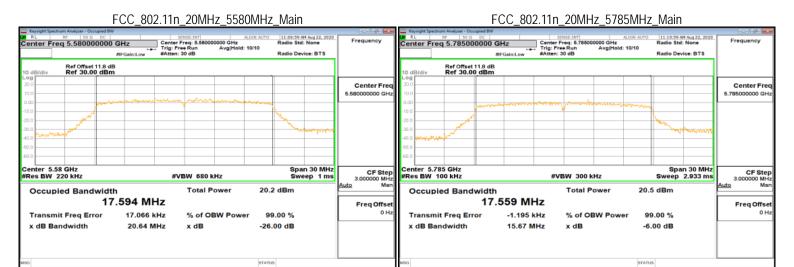
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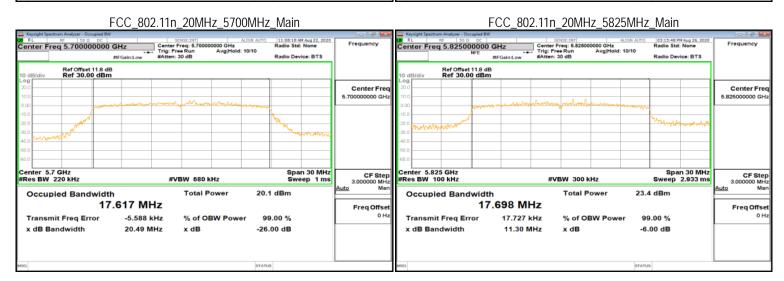
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## MAXIMUM CONDUCTED OUTPUT POWER MEASUREMENT

### Standard Applicable 9.1

### **FCC**

OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device )	1 Watt(30dBm)
U-NII-1		Fixed point-to-point Access Ponit	1 Watt(30dBm)
		Mobile and portable client device	250mW(23.98dBm)
U-NII-2A			250mW(23.98dBm) or 11dBm+10 log B
U-NII-2C	<b>V</b>		250mW(23.98dBm) or 11dBm+10 log B
U-NII-3			1 Watt(30dBm)

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum transmit power shall be reduced by the amount in dB that the direction-al gain of the antenna exceeds 6 dBi.

The antenna gain is grater than 6 dBi, therefore the limit needs to be reduced as below: **FCC Power Limit Reduction** 

	Effective Legacy Gain (dBi)	Conducted Power Limit (dBm)
UNII-1	5.90	23.98
UNII-2A	5.90	23.98
U-NII-2C	6.50	23.48
U-NII-3	6.60	29.40

#### 9.2 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules. 2.
- Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
- Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 4.
- Record the max. reading and add 10 log(1/duty cycle).
- 6. Repeat above procedures until all frequency (low, middle, and high channel) measured were complete.

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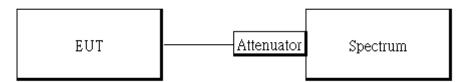


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### 9.3 **Measurement Equipment Used**

SGS Conducted Room								
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due			
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021			
DC Power Sup- ply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020			
Power Meter	Anritsu	ML2496A	1242004	11/05/2019	11/04/2020			
Power Sensor	Anritsu	MA2411B	1207365	11/05/2019	11/04/2020			
Power Sensor	Anritsu	MA2411B	1207368	11/05/2019	11/04/2020			
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021			
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021			
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021			

### 9.4 **Test Set-up**



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#### 9.5 **Measurement Result**

### 9.5.1 **Conducted output power (FCC)**

### 802.11a Ch0

002.11a_C	1	1						
	Frequency	Data	TOTAL	TOTAL		REQUIRED		
СН	(MHz)		POWER	POWER		LIMIT		RESULT
	(IVITIZ)	Rate	(dBm)	(mW)	(dBm)			
36	5180	6	12.89	19.445		23.98		PASS
44	5220	6	15.46	35.141		23.98		PASS
48	5240	6	15.48	35.303		23.98		PASS
52	5260	6	15.30	33.870	23.98	or 11+10log(B) =	24.08	PASS
60	5300	6	15.42	34.819	23.98	or 11+10log(B) =	24.09	PASS
64	5320	6	15.47	35.222	23.98	or 11+10log(B) =	24.07	PASS
100	5500	6	13.21	20.932	23.48	or 11+10log(B) =	24.09	PASS
116	5580	6	15.32	34.026	23.48	or 11+10log(B) =	24.07	PASS
140	5700	6	15.44	34.980	23.48	or 11+10log(B) =	24.12	PASS
149	5745	6	15.38	34.500		29.4		PASS
157	5785	6	15.28	33.715	29.4		PASS	
165	5825	6	15.29	33.792		29.4		PASS

## 802.11n HT20 Ch0

			TOTAL	TOTAL		REQUIRED		
СН	Frequency	Data	POWER	POWER		LIMIT		RESULT
	(MHz)	Rate	(dBm)	(mW)		(dBm)		
36	5180	MCS0	12.97	19.822		23.98		PASS
44	5220	MCS0	15.32	34.053		23.98		PASS
48	5240	MCS0	15.46	35.169		23.98		
52	5260	MCS0	15.49	35.412	23.98	or 11+10log(B) =	24.16	PASS
60	5300	MCS0	15.29	33.819	23.98	or 11+10log(B) =	24.09	PASS
64	5320	MCS0	15.46	35.169	23.98	or 11+10log(B) =	24.13	PASS
100	5500	MCS0	13.38	21.785	23.48	or 11+10log(B) =	24.19	PASS
116	5580	MCS0	15.47	35.250	23.48	or 11+10log(B) =	24.15	PASS
140	5700	MCS0	14.36	27.299	23.48	or 11+10log(B) =	24.12	PASS
149	5745	MCS0	15.45	35.088		29.4		PASS
157	5785	MCS0	15.49	35.412		29.4		PASS
165	5825	MCS0	15.41	34.766		29.4		PASS

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## 10 MAXIMUM POWER SPECTRAL DENSITY

#### Standard Applicable 10.1

### **FCC**

OPERZTION Band		EUT CATEGORY	LIMIT
		Access Point (Master device )	17dBm/ MHz
U-NII-1		Fixed point-to-point Access Ponit	17 dBitti/ Wil IZ
	√	Mobile and portable client device	11dBm/ MHz
U-NII-2A	√		11dBm/ MHz
U-NII-2C	√		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

If transmitting antennas of directional gain greater than 6 dBi are used, the Maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna gain is grater than 6 dBi, therefore the limit needs to be reduced as below: **FCC PSD Limit Attenuation** 

	Effective Legacy Gain (dBi)	PSD Limit		
UNII-1	5.90	11.00 dBm/MHz		
UNII-2A	5.90	11.00 dBm/MHz		
U-NII-2C	6.50	10.50 dBm/MHz		
U-NII-3	6.60	29.40	dBm/500 kHz	

#### 10.2 **Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules .
- 3. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.

## 4. For U-NII1, U-NII-2A, U-NII-2C Band:

Set RBW=1MHz, VBW=3MHz, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

### For U-NII-3 Band:

Set RBW=500 kHz, VBW≥ 3RBW, where span is enough to capture the entire bandwidth, Sweep time = Auto (601 pts), detector = sample, traces 100 sweeps of video averaging. (SA-2 with the omission of procedure x, the integration with 26dB EBW bandwidth)

- 5. User the cursor on spectrum to peak search the highest level of trace
- 6. Record the max. reading and add 10 log(1/duty cycle).
- 7. Repeat above procedures until all default test channel (low, middle, and high) was complete.

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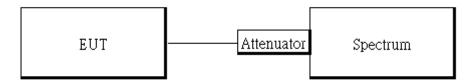


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### 10.3 **Measurement Equipment Used**

SGS Conducted Room								
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due			
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021			
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020			
Temperature Chamber	TERCHY	MHG-120LF	911009	05/20/2020	05/19/2021			
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021			
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021			

### **Test Set-up** 10.4



#### 10.5 **Measurement Result**

#### 10.5.1 Power spectral density

POWER DENSITY 802.11a MODE_Ch0								
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm/MHz)-UNII 1~2C (dBm/500kHz)-UNII 3	Limit (dBm/MHz)-UNII 1~2C (dBm/500kHz)-UNII 3	Margin (dB)			
5180.00	1.83	0.31	2.14	11.00	-8.86			
5220.00	5.53	0.31	5.84	11.00	-5.16			
5240.00	5.20	0.31	5.51	11.00	-5.49			
5260.00	4.80	0.31	5.11	11.00	-5.89			
5300.00	5.12	0.31	5.43	11.00	-5.57			
5320.00	4.76	0.31	5.07	11.00	-5.93			
5500.00	2.45	0.31	2.76	10.50	-7.74			
5580.00	4.54	0.31	4.85	10.50	-5.65			
5700.00	5.49	0.31	5.80	10.50	-4.70			
5745.00	2.41	0.31	2.72	29.40	-26.68			
5785.00	1.74	0.31	2.05	29.40	-27.35			
5825.00	1.67	0.31	1.98	29.40	-27.42			

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POWER DENSITY 802.11n HT20 MODE_Ch0							
Frequency (MHz)	PSD W/O Duty Factor (dBm)	Duty Factor	PSD With Duty Factor (dBm/MHz)-UNII 1~2C (dBm/500kHz)-UNII 3	Limit (dBm/MHz)-UNII 1~2C (dBm/500kHz)-UNII 3	Margin (dB)		
5180	2.48	0.33	2.81	11	-8.19		
5220	5.06	0.33	5.39	11	-5.61		
5240	4.87	0.33	5.20	11	-5.80		
5260	4.94	0.33	5.27	11	-5.73		
5300	4.69	0.33	5.02	11	-5.98		
5320	4.26	0.33	4.59	11	-6.41		
5500	2.48	0.33	2.81	10.5	-7.69		
5580	3.67	0.33	4.00	10.5	-6.50		
5700	4.09	0.33	4.42	10.5	-6.08		
5745	2.04	0.33	2.37	29.4	-27.03		
5785	2.10	0.33	2.43	29.4	-26.97		
5825	1.42	0.33	1.75	29.4	-27.65		

Note:

Cable Loss=

11.75 dB

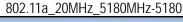
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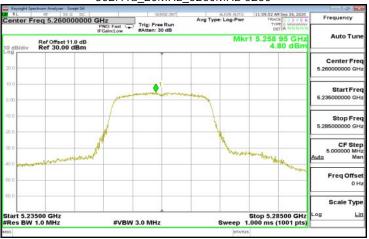


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## 802.11a 20MHz 5260MHz-5260





# 802.11a\_20MHz\_5220MHz-5220

802.11a\_20MHz\_5300MHz-5300





## 802.11a\_20MHz\_5240MHz-5240

802.11a\_20MHz\_5320MHz-5320





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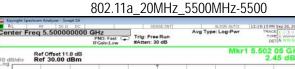
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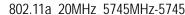
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802.11a\_20MHz\_5580MHz-5580

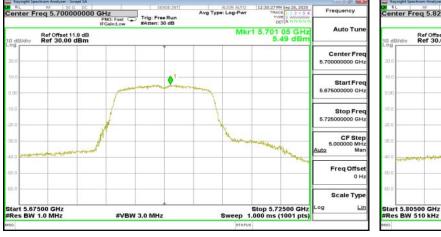
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802.11a\_20MHz\_5700MHz-5700

802.11a\_20MHz\_5825MHz-5825





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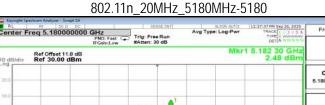
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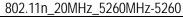
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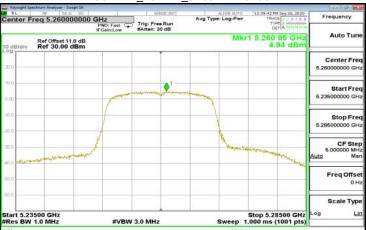
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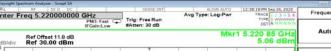


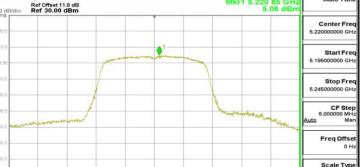




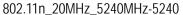


802.11n\_20MHz\_5220MHz-5220

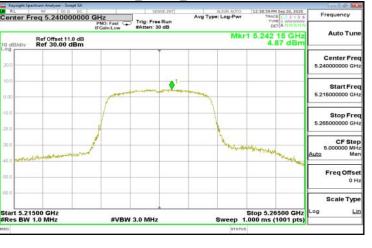


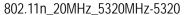






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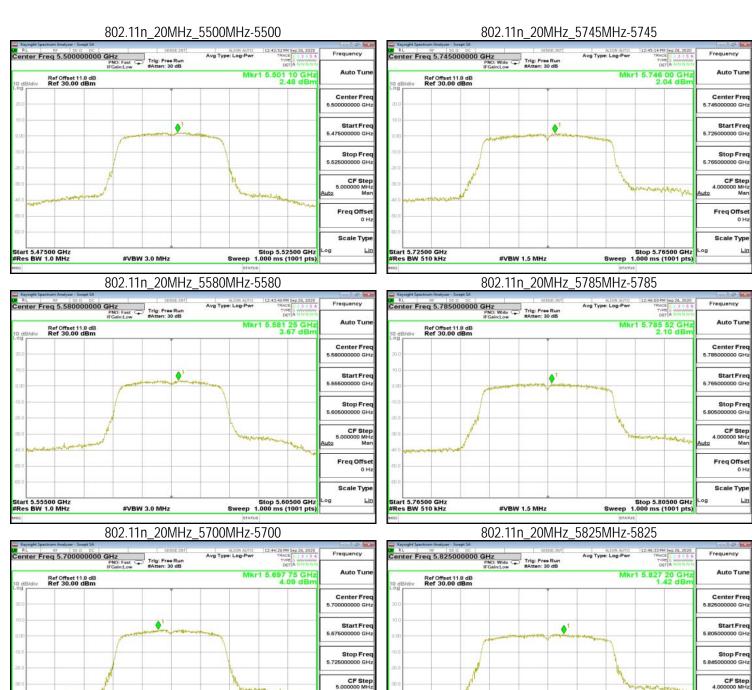
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Freq Offse

台灣檢驗科技股份有限公司

#VBW 3.0 MHz

SGS Taiwan Ltd. No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan/新北市五股區新北產業園區五工路 134 號 f (886-2) 2298-0488

5.80500 GHz BW 510 kHz

#VBW 1.5 MHz

Freq Offse



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## 11 UNDESIRABLE RADIATED EMISSION MEASUREMENT

# Standard Applicable

# **11.1.1 Band Edge**

The maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- 1. For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- 2. For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

APPLICABLE TO	EIRP LIMIT	FIELD STRENGTH AT 3m
15.407(b)(1)		
RSS-247 §6.2.1.2 15.407(b)(2)		
RSS-247 §6.2.2.2	PK: -27 (dBm/MHz)	PK: 68.3 (dBµV/m)
15.407(b)(3) RSS-247 §6.2.3.2		
K33-241 §0.2.3.2	PK:-27 (dBm/MHz) *1	PK: 68.2(dBµV/m) *1
15.407(b)(4)(i)	PK:10 (dBm/MHz) *2	PK:105.2 (dBµV/m) *2
RSS-247 §6.2.4.2	PK:15.6 (dBm/MHz) *3	PK: 110.8(dBµV/m) *3
	PK:27 (dBm/MHz) *4	PK:122.2 (dBµV/m) *4

<sup>\*1</sup> beyond 75 MHz or more above of the bandedge.

 $EIRP = ((E^*d)^2) / 30$ , where E is the field in V/m, d is the measurement distance (3m), EIRP is the equivalent isotropically radiated power in Watts.

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<sup>\*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

<sup>\*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

<sup>\*4</sup> from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.



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## 11.1.2 Spurious Emission

Unwanted spurious emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

Frequency (MHz)	Field strength (microvolts/meter)	Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

### Note:

- The lower limit shall apply at the transition frequencies. 1.
- 2. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m)

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### 11.2 **Measurement Equipment Used**

SGS SAC-III										
Name of Equip- ment	Manufacturer	Model	Serial Num- ber	Calibration Date	Calibration Due					
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020					
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/10/2020	01/09/2021					
EMI Test Re- ceiver	R&S	ESU 40	100363	04/29/2020	04/28/2021					
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/20/2019	11/19/2020					
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020					
Attenuator	Woken	WATT-218FS- 10	RF25	11/20/2019	11/19/2020					
Band Rejection Filter	Micro-Tronics	G015	RF100	11/20/2019	11/19/2020					
Band Rejection Filter	Micro-Tronics	G016	RF101	11/20/2019	11/19/2020					
Band Rejection Filter	Micro-Tronics	G021	RF102	11/20/2019	11/19/2020					
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/20/2019	11/19/2020					
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/20/2019	11/19/2020					

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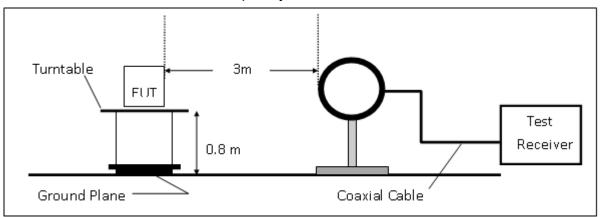
\*\*CST Triven Left\*\* No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until Part No. 124 We Kung Read New Trips Left until P



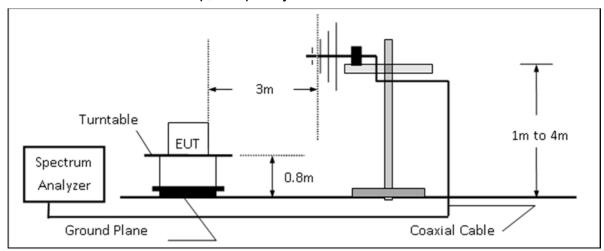
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#### 11.3 **Test SET-UP**

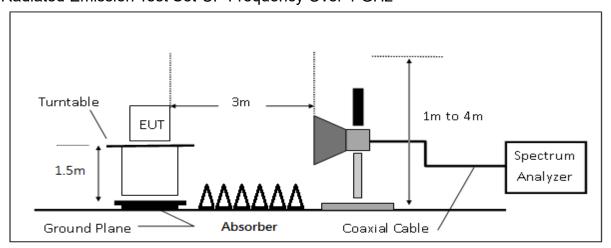
(A) Radiated Emission Test Set-UP Frequency Below 30MHz.



# (B) Radiated Emission Test Set-Up, Frequency form 30MHz to 1000MHz



# (C) Radiated Emission Test Set-UP Frequency Over 1 GHz



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### **Measurement Procedure** 11.4

- The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules.
- 3. The EUT was placed on a turn table with 0.8m for frequency< 1GHz and 1.5m for frequency> 1GHz above ground plane.
- 4. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 5. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- Set the spectrum analyzer as RBW=120 kHz and VBW=300 kHz for Peak Detector (PK) and Quasi-peak (QP) at frequency below 1 GHz.
- At frequency above 1 GHz, Set the spectrum analyzer: 7.
  - A. RBW=1 MHz, VBW=3 MHz for Peak Detector.
  - **B.** Set the spectrum analyzer as RBW=1 MHz, VBW=10 Hz (Duty cycle > 98%) or VBW ≥ 1/T (Duty cycle < 98%) for **Average** Detector.
- Maximum procedure was performed on the six highest emissions to ensure EUT compliance. 8.
- And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- **10.** Repeat above procedures until all frequency measured were complete.

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### 11.5 **Field Strength Calculation**

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

# FS = RA + AF + CL - AG

Where FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

The limit of the emission level is expressed in dBuV/m, which converts 20\*log(uV/m)

Actual  $FS(dB\mu V/m) = SPA$ . Reading level(dB $\mu V$ ) + Factor(dB)

 $Factor(dB) = Antenna\ Factor(dB\mu V/m) + Cable\ Loss(dB) - Pre\_Amplifier\ Gain(dB)$ 

## Test Results of Radiated Spurious Emissions form 9 KHz to 30 MHz

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit per 15.31(o) was not reported.

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## 11.7 Radiated Spurious Emission Measurement Result

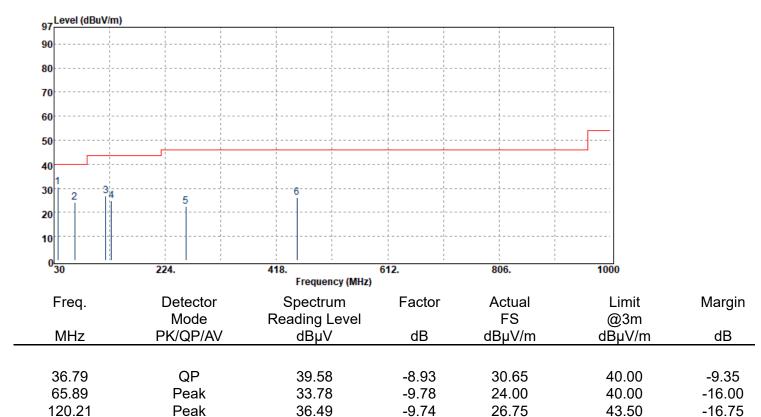
## 11.7.1 Below 1GHz Worst-Case Data:

Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11a Test Date :2020-08-10

Test Frequency :5220 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL EUT Pol :H Plane Engineer :Ricky



-8.55

-7.53

-2.42

24.97

22.41

26.09

43.50

46.00

46.00

-18.53

-23.59

-19.91

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33.52

29.94

28.51

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129.91

259.89

453.89

Peak

Peak

Peak



Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

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Antenna Pol.

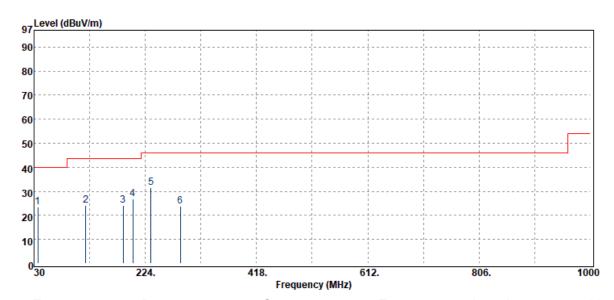
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5220 MHz Temp./Humi. :25.8/60

:Ricky **EUT Pol** :H Plane Engineer

:Tx CH Mid



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
36.79	Peak	32.42	-8.93	23.49	40.00	-16.51
120.21	Peak	33.91	-9.74	24.17	43.50	-19.33
185.20	Peak	33.52	-9.24	24.28	43.50	-19.22
202.66	Peak	36.44	-9.70	26.74	43.50	-16.76
233.70	Peak	40.04	-8.62	31.42	46.00	-14.58
285.11	Peak	30.23	-6.41	23.82	46.00	-22.18

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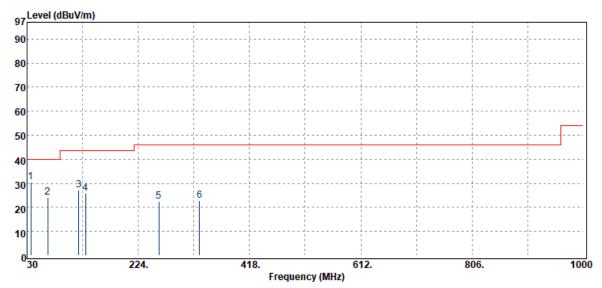
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5300 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dΒμV/m	dB
36.79	QP	39.47	-8.93	30.54	40.00	-9.46
65.89	Peak	33.90	-9.78	24.12	40.00	-15.88
120.21	Peak	36.82	-9.74	27.08	43.50	-16.42
131.85	Peak	34.28	-8.42	25.86	43.50	-17.64
259.89	Peak	30.10	-7.53	22.57	46.00	-23.43
330.70	Peak	27.86	-5.14	22.72	46.00	-23.28

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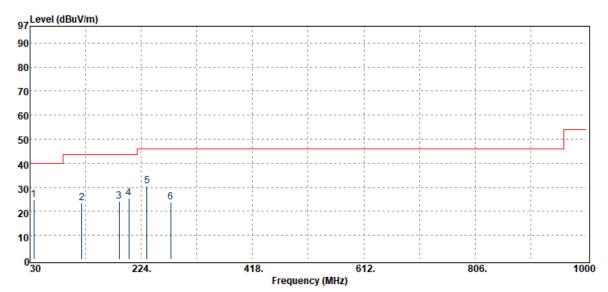
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5300 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dΒμV/m	dBμV/m	dB
36.79	Peak	33.89	-8.93	24.96	40.00	-15.04
120.21	Peak	33.31	-9.74	23.57	43.50	-19.93
185.20	Peak	33.24	-9.24	24.00	43.50	-19.50
202.66	Peak	35.30	-9.70	25.60	43.50	-17.90
233.70	Peak	39.01	-8.62	30.39	46.00	-15.61
275.41	Peak	30.53	-6.83	23.70	46.00	-22.30

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:H Plane

**EUT Pol** 

Report No.: ER/2020/80015

:Ricky

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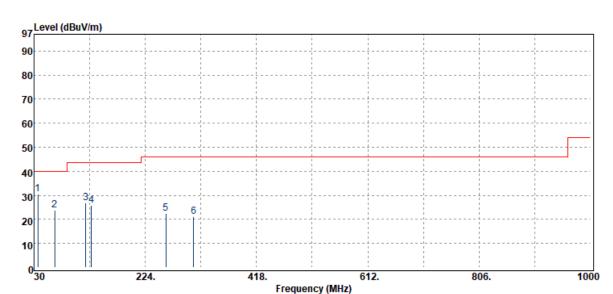
Engineer

Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5580 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
						_
36.79	QP	39.39	-8.93	30.46	40.00	-9.54
65.89	Peak	33.52	-9.78	23.74	40.00	-16.26
120.21	Peak	36.68	-9.74	26.94	43.50	-16.56
129.91	Peak	34.42	-8.55	25.87	43.50	-17.63
259.89	Peak	29.90	-7.53	22.37	46.00	-23.63
308.39	Peak	27.26	-5.96	21.30	46.00	-24.70

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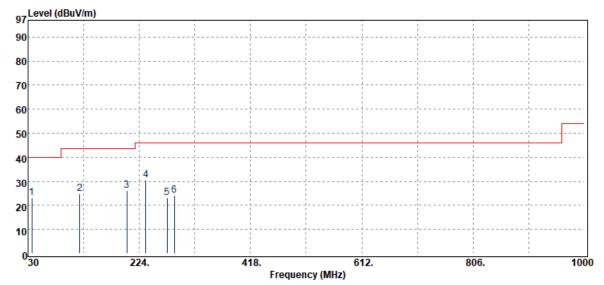
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5580 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
		•		1	•	
36.79	Peak	32.11	-8.93	23.18	40.00	-16.82
120.21	Peak	34.48	-9.74	24.74	43.50	-18.76
202.66	Peak	36.04	-9.70	26.34	43.50	-17.16
235.64	Peak	39.04	-8.44	30.60	46.00	-15.40
272.50	Peak	30.07	-6.91	23.16	46.00	-22.84
285.11	Peak	30.49	-6.41	24.08	46.00	-21.92

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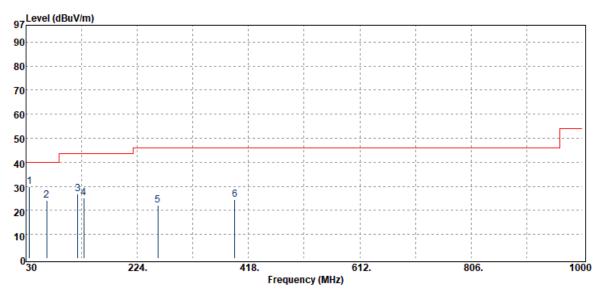
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5785 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
IVITZ	PN/QP/AV	чьμν	uБ	ασμν/π	ασμν/ιιι	<u>ub</u>
35.82	QP	38.76	-8.88	29.88	40.00	-10.12
65.89	Peak	33.97	-9.78	24.19	40.00	-15.81
120.21	Peak	36.43	-9.74	26.69	43.50	-16.81
130.88	Peak	33.45	-8.43	25.02	43.50	-18.48
259.89	Peak	29.75	-7.53	22.22	46.00	-23.78
393.75	Peak	28.88	-4.35	24.53	46.00	-21.47
65.89 120.21 130.88 259.89	Peak Peak Peak Peak	33.97 36.43 33.45 29.75	-9.78 -9.74 -8.43 -7.53	24.19 26.69 25.02 22.22	40.00 43.50 43.50 46.00	-15.81 -16.81 -18.48 -23.78

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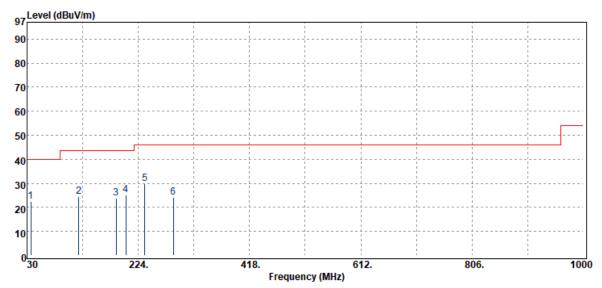
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5785 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dΒμV/m	dB
36.79	Peak	31.40	-8.93	22.47	40.00	-17.53
120.21	Peak	34.18	-9.74	24.44	43.50	-19.06
185.20	Peak	32.97	-9.24	23.73	43.50	-19.77
202.66	Peak	34.73	-9.70	25.03	43.50	-18.47
235.64	Peak	38.42	-8.44	29.98	46.00	-16.02
285.11	Peak	30.53	-6.41	24.12	46.00	-21.88

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### 11.7.2 **Above 1GHz Worst-Case Data:**

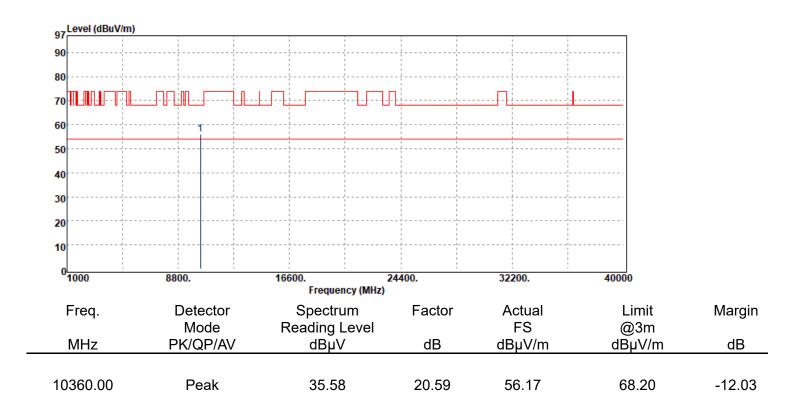
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Test Date Operation Mode** :802.11a :2020-08-10

Temp./Humi. **Test Frequency** :5180 MHz :25.8/60

**Test Mode** :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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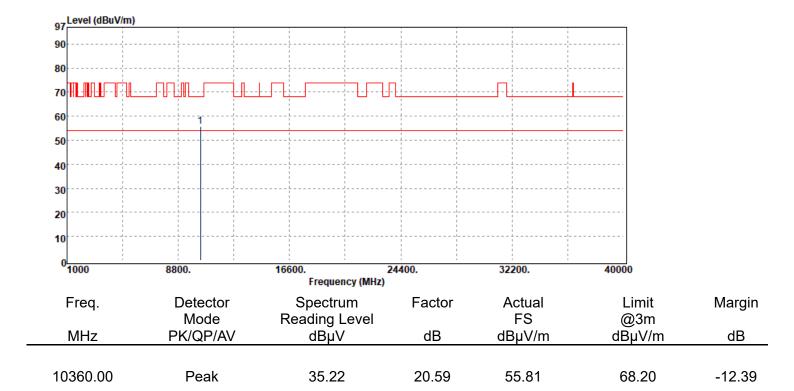
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5180 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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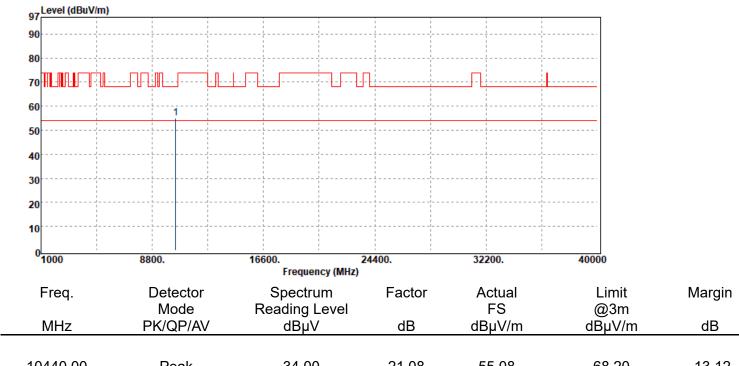
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5220 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



1000	8800.	16600. Frequency (MHz	24400. z)	32200.	40000	
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBµV/m	dB
10440.00	Peak	34.00	21.08	55.08	68.20	-13.12

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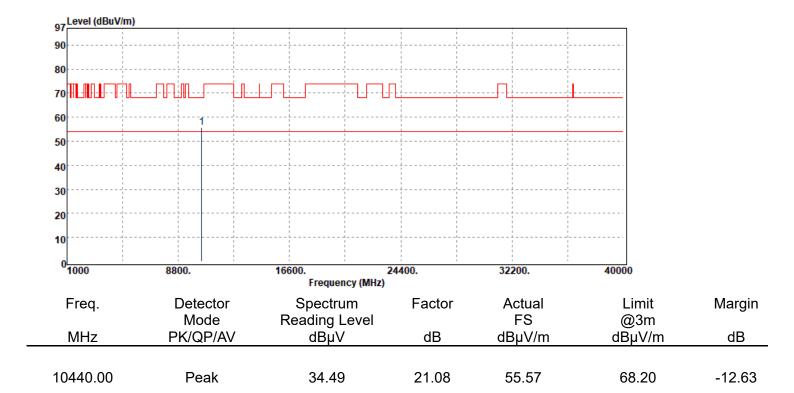
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5220 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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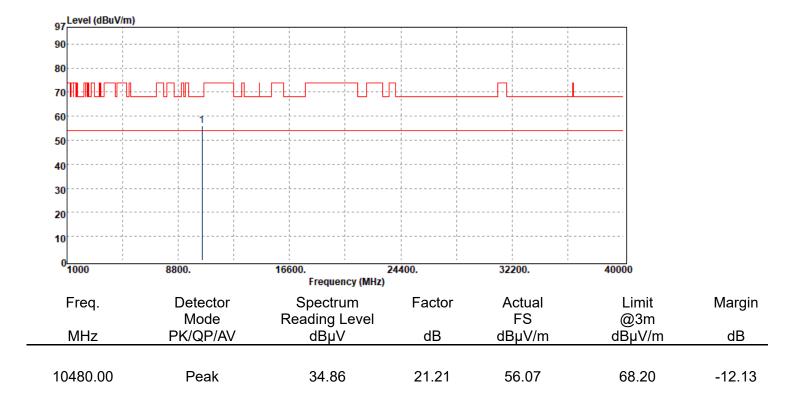
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5240 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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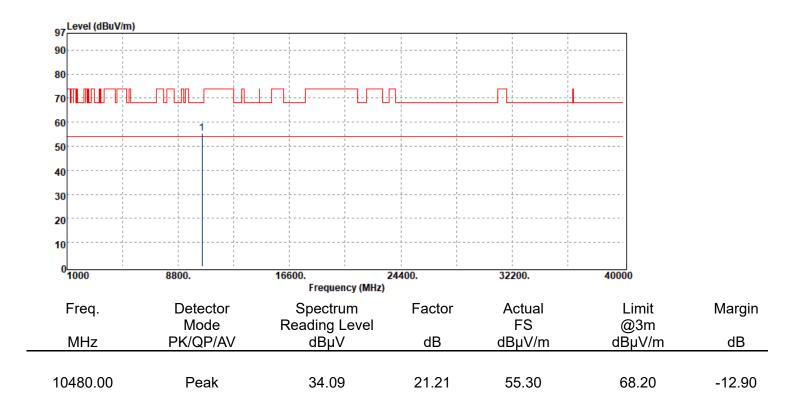
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5240 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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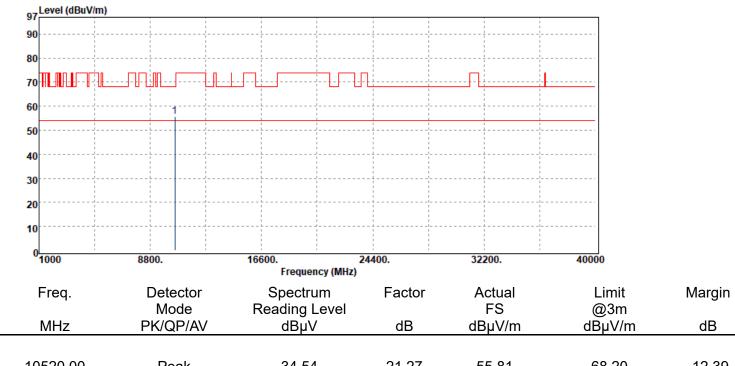
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5260 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10520.00	Peak	34.54	21.27	55.81	68.20	-12.39

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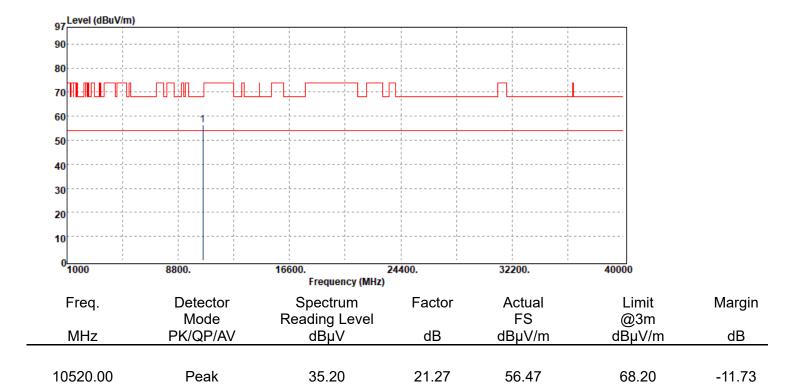
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5260 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11a Test Date :2020-08-10

Test Frequency :5300 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

EUT Pol :H Plane Engineer :Ricky



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Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

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Antenna Pol.

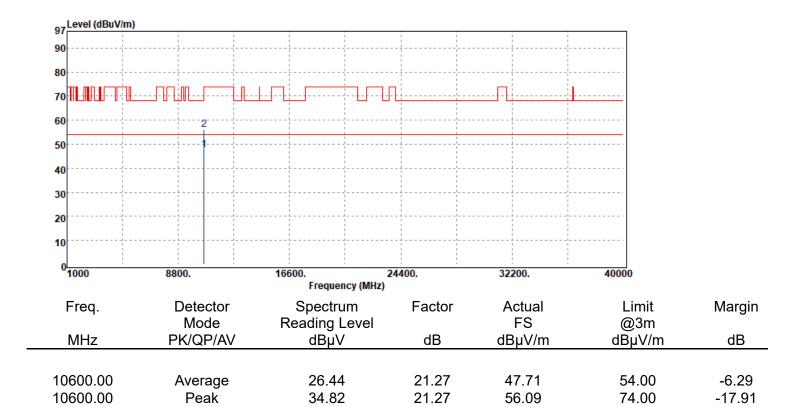
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5300 MHz Temp./Humi. :25.8/60

**EUT Pol** :H Plane Engineer :Ricky

:Tx CH Mid



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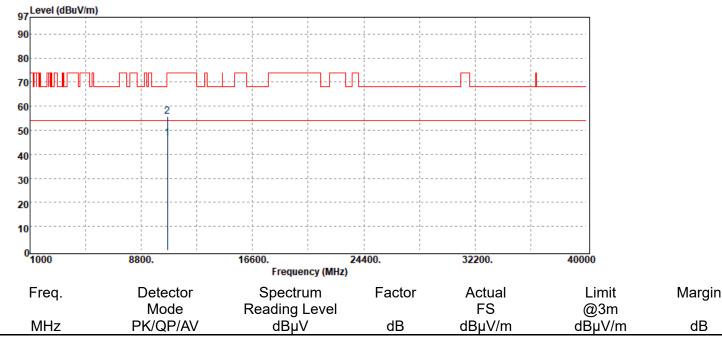
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5320 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



1104.	Mode	Reading Level	1 40101	FS	@3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
10640.00	Average	25.51	21.21	46.72	54.00	-7.28
10640.00	Peak	34.58	21.21	55.79	74.00	-18.21

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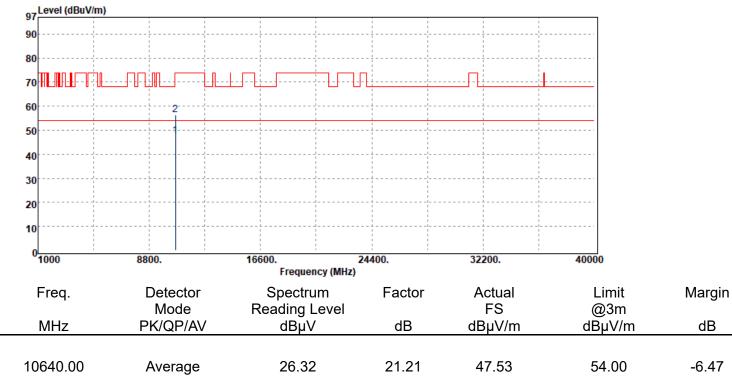
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**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5320 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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10640.00	Average	26.32	21.21	47.53	54.00	-6.47
10010.00	7 (V 0) ago	20.02		17.00	01.00	0.17
10640.00	Peak	35.27	21.21	56.48	74.00	-17.52
100-0.00	i can	00.21	21.21	00.40	7 4.00	17.02

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Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5500 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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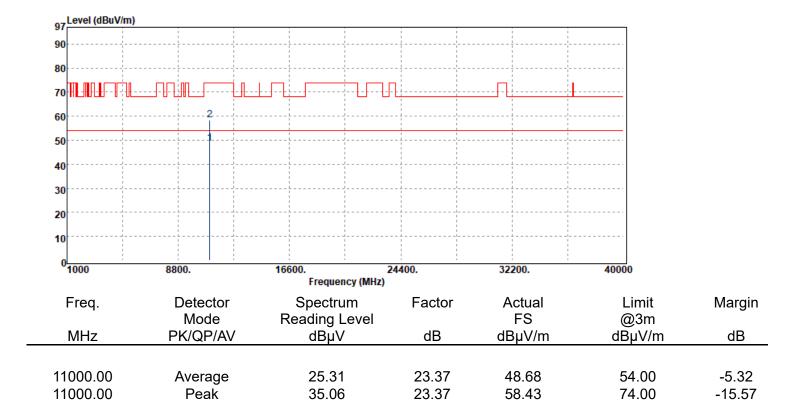
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5500 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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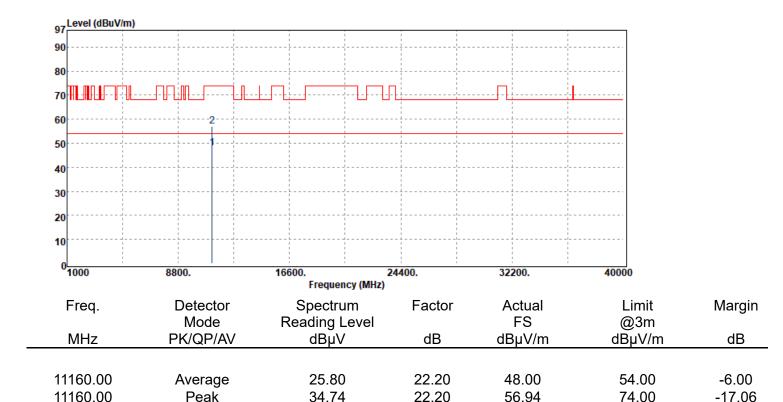
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5580 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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以北只去稻朋,山和北外里俊料湖沙力港口名委,同时山港口岱伊丽M工。七和北土领土八司者石坎河,工可部外海制。	

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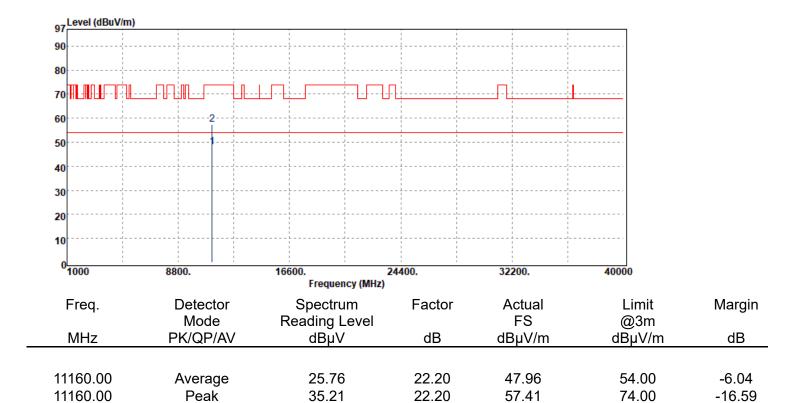
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-10

**Test Frequency** :5580 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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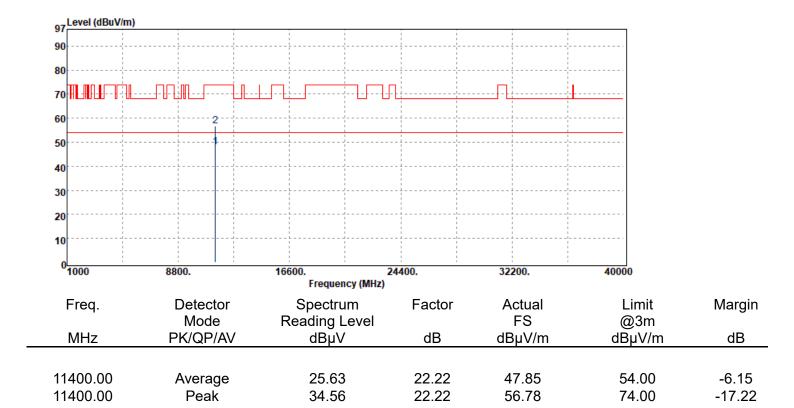
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5700 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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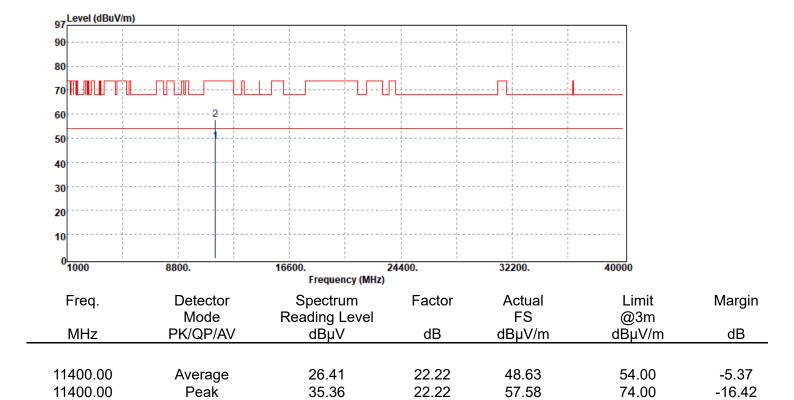
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11a Test Date :2020-08-10

Test Frequency :5700 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

EUT Pol :H Plane Engineer :Ricky



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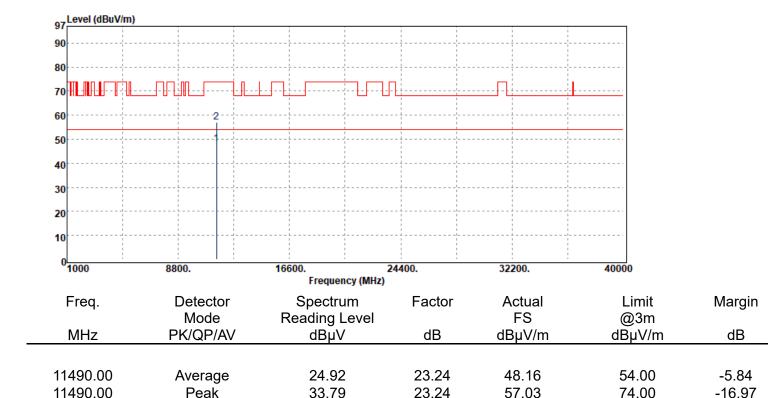
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5745 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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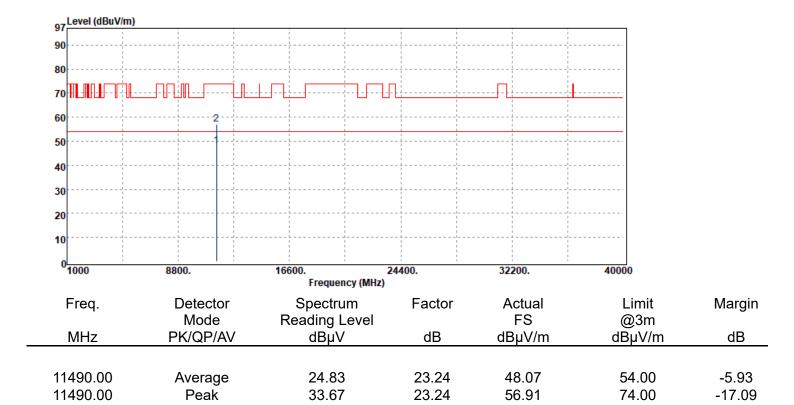
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5745 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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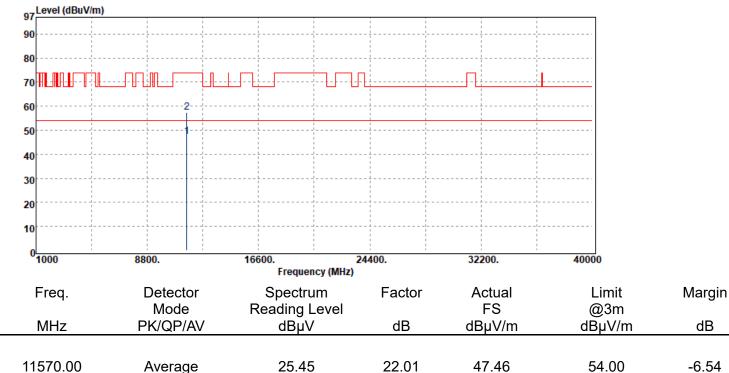
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5785 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
11570.00	Average	25.45	22.01	47.46	54.00	-6.54
11570.00	Peak	35.35	22.01	57.36	74.00	-16.64

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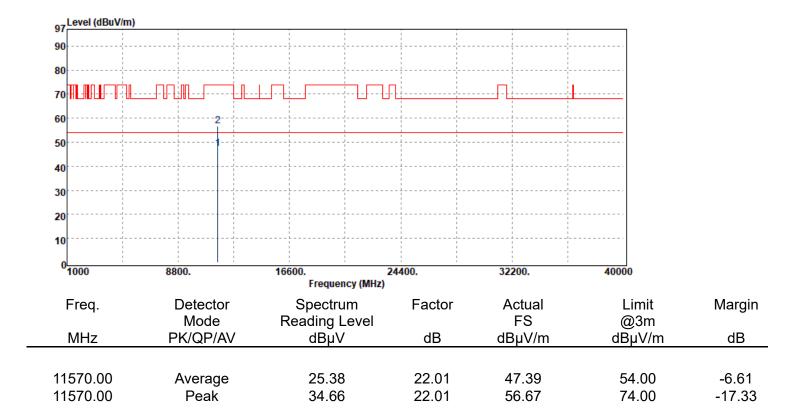
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5785 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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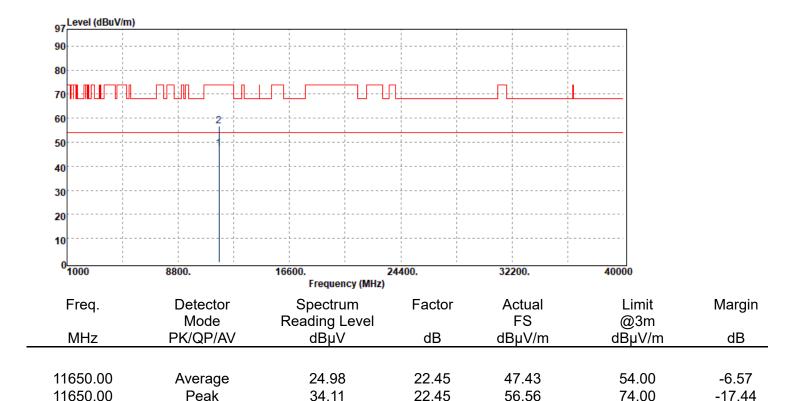
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11a Test Date :2020-08-10

Test Frequency :5825 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

EUT Pol :H Plane Engineer :Ricky



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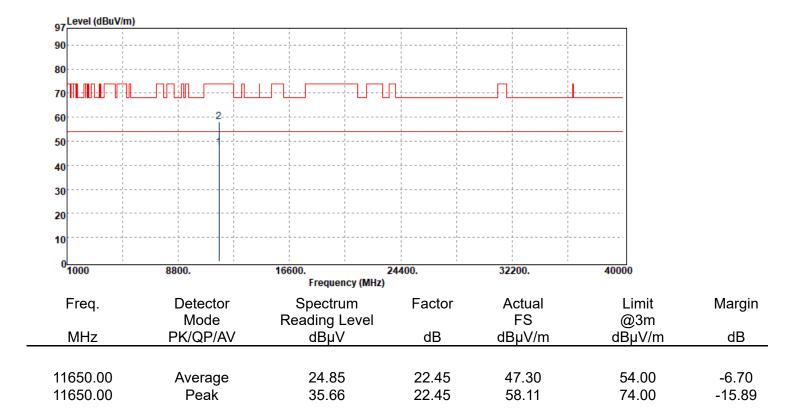
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11a

**Test Frequency** :5825 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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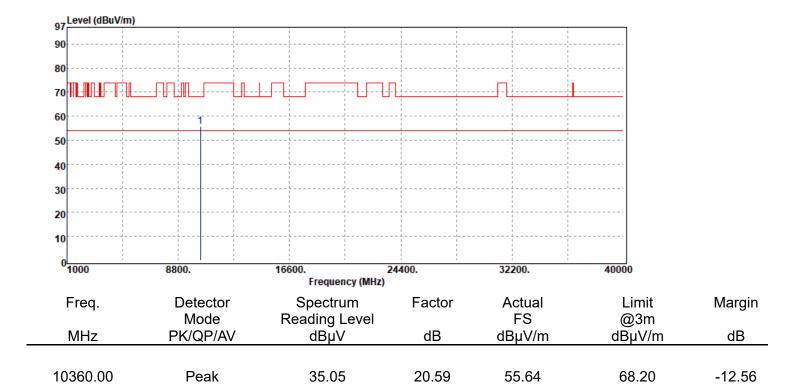
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-10

Test Frequency :5180 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

EUT Pol :H Plane Engineer :Ricky



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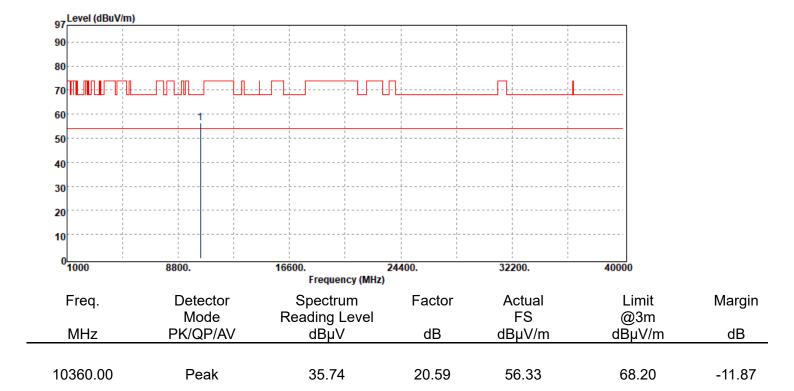
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**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5180 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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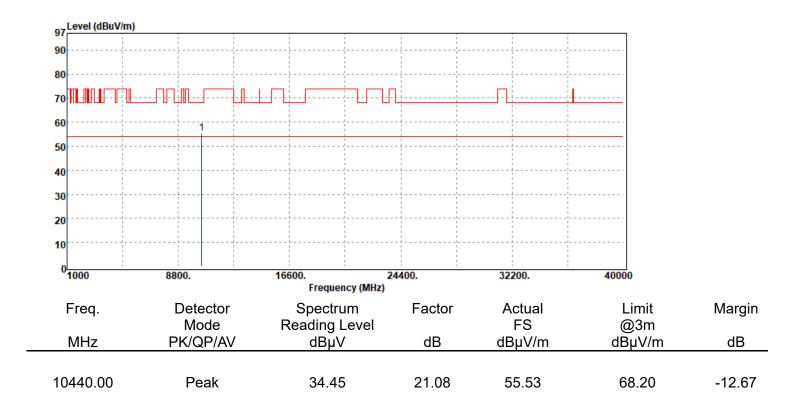
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5220 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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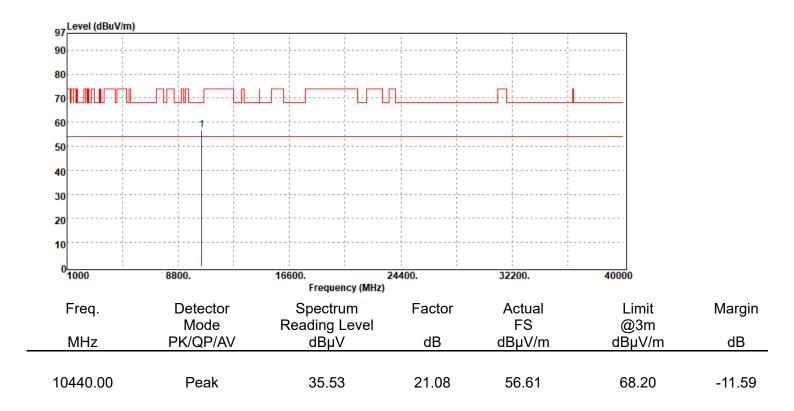
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-10

Test Frequency :5220 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

EUT Pol :H Plane Engineer :Ricky



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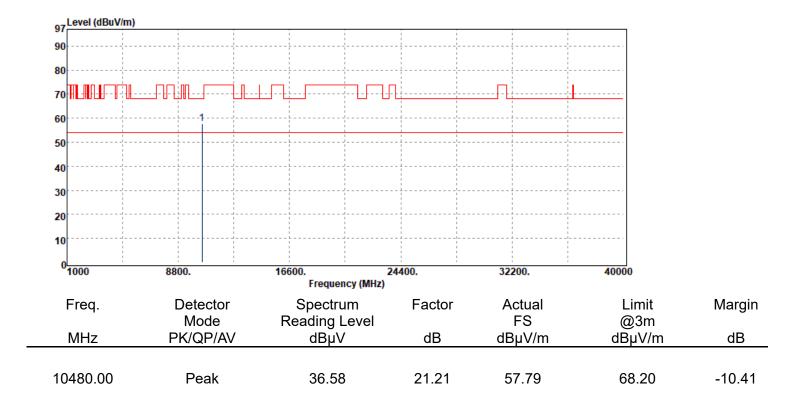
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5240 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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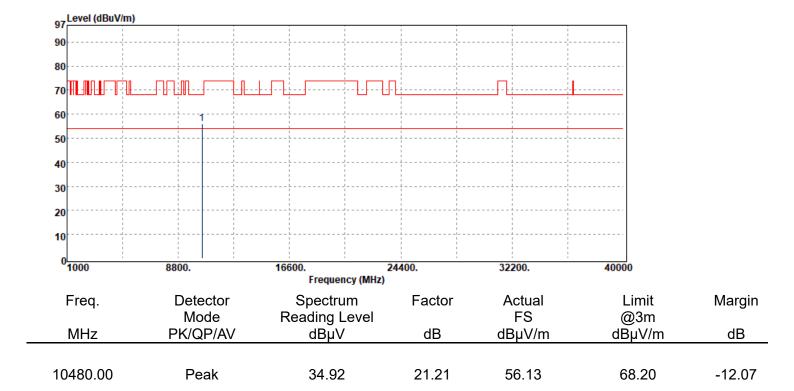
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-10

Test Frequency :5240 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

EUT Pol :H Plane Engineer :Ricky



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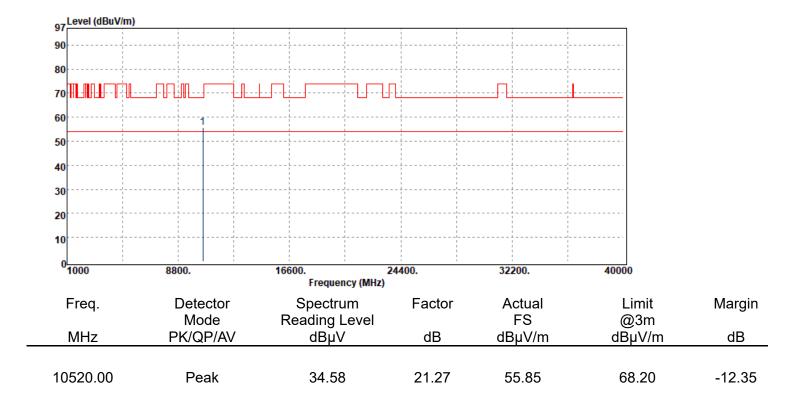
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5260 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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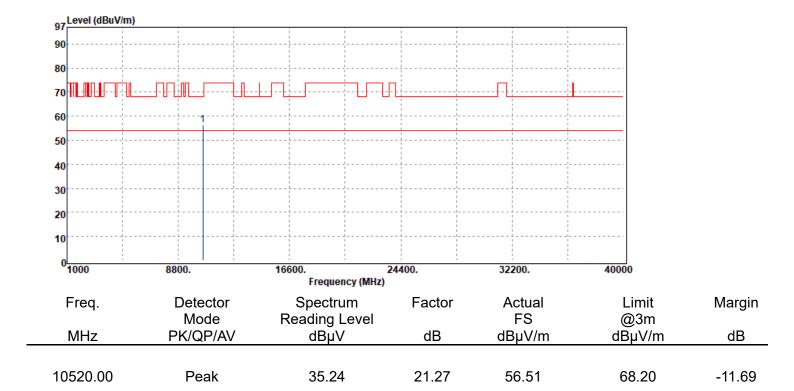
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5260 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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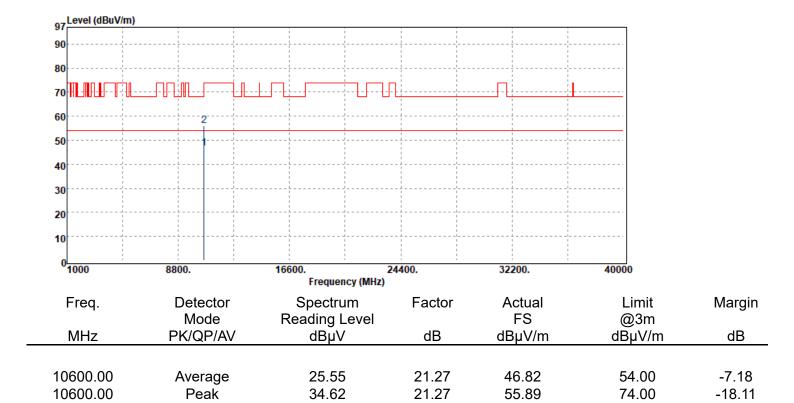
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5300 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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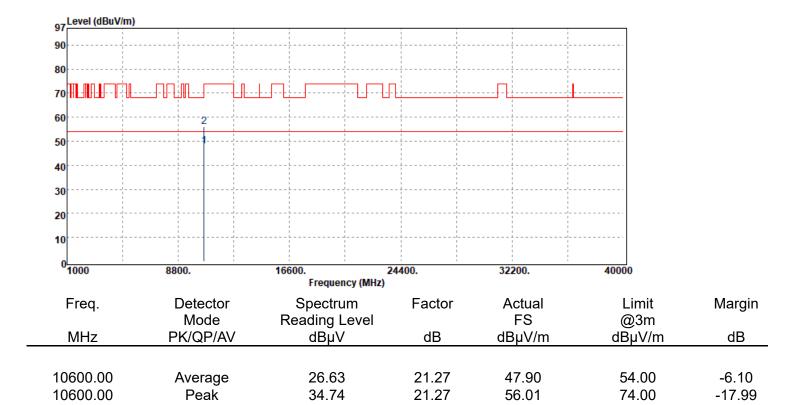
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-10

Test Frequency :5300 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

EUT Pol :H Plane Engineer :Ricky



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Test Mode

Report No.: ER/2020/80015

:VERTICAL

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Antenna Pol.

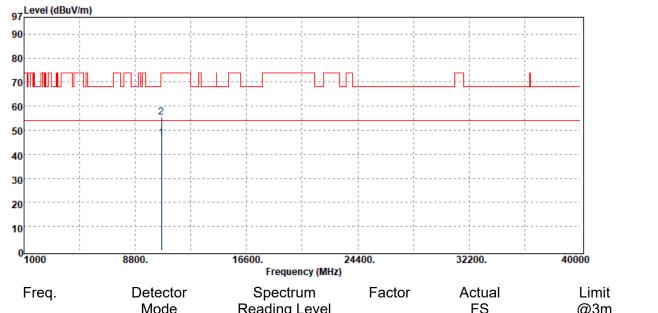
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5320 MHz Temp./Humi. :25.8/60

**EUT Pol** :H Plane Engineer :Ricky

:Tx CH High



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBµV	dB	dBµV/m	dBµV/m	dB
10640.00	Average	25.51	21.21	46.72	54.00	-7.28
10640.00	Peak	34.18	21.21	55.39	74.00	-18.61

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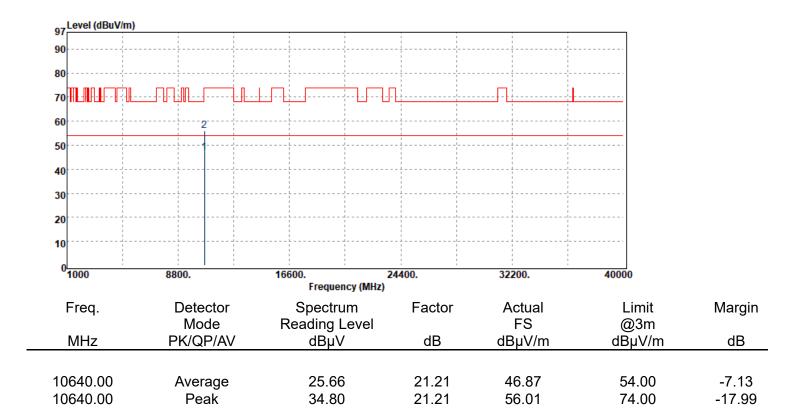
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5320 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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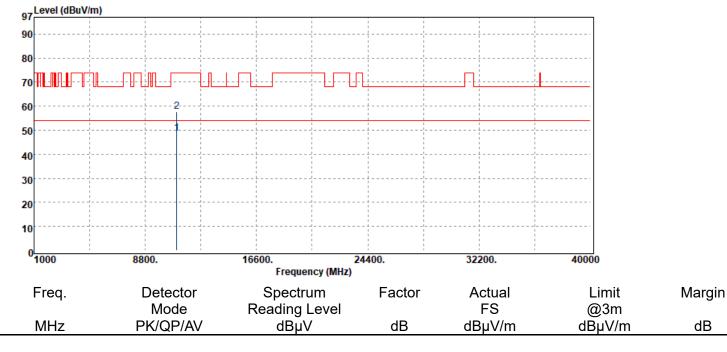
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5500 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBμV/m	dB
11000.00 11000.00	Average Peak	25.43 34.50	23.37 23.37	48.80 57.87	54.00 74.00	-5.20 -16.13

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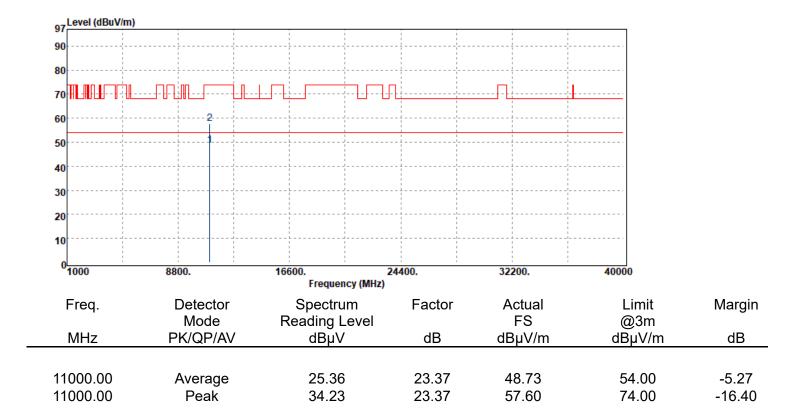
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5500 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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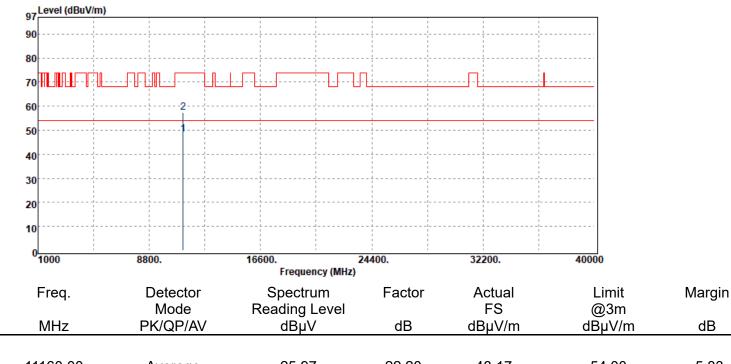
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5580 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
11160.00	Average	25.97	22.20	48.17	54.00	-5.83
11160.00	Peak	35.36	22.20	57.56	74.00	-16.44

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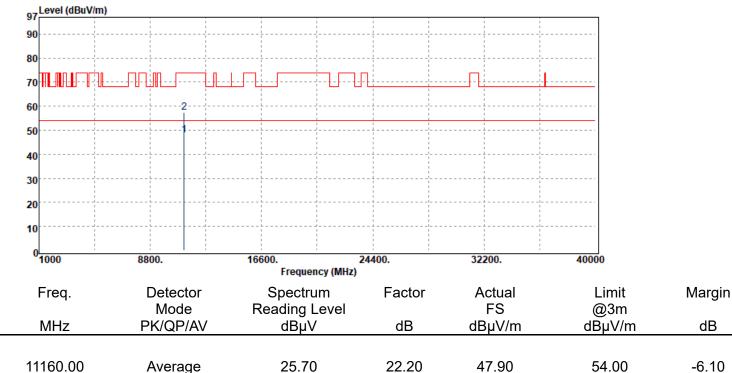
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5580 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



MHz	Mode PK/QP/AV	Reading Level dBuV	dB	FS dBµV/m	@3m dBµV/m	dB
11160.00	Average	25.70	22.20	47.90	54.00	-6.10
11160.00	Peak	35.19	22.20	57.39	74.00	-16.61

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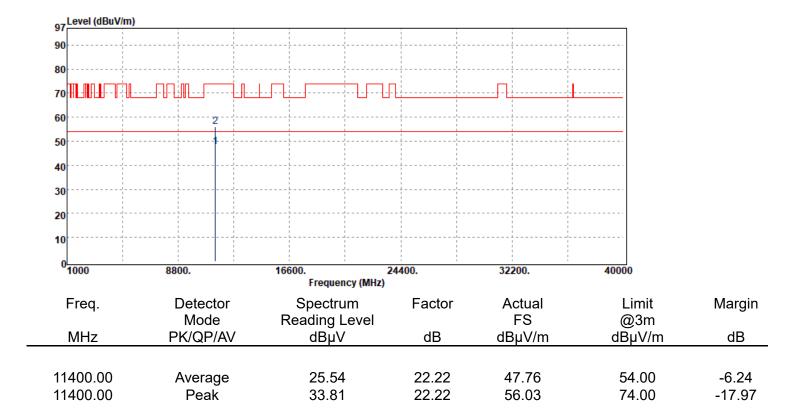
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-10

Test Frequency :5700 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

EUT Pol :H Plane Engineer :Ricky



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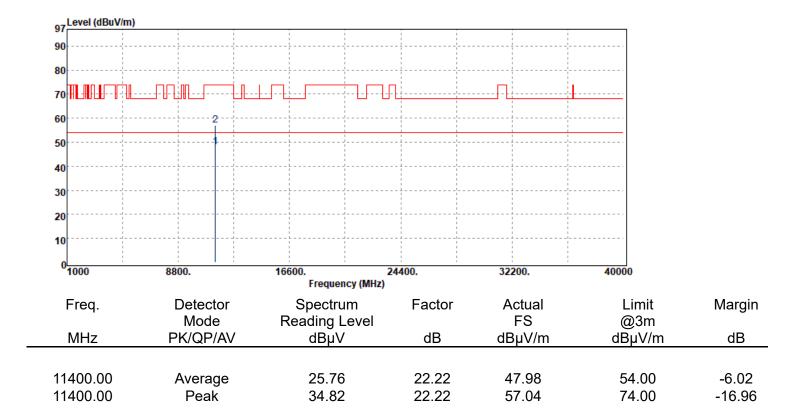
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5700 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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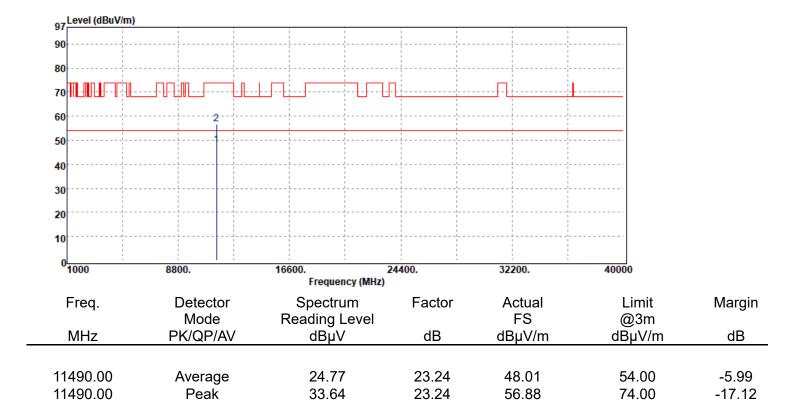
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5745 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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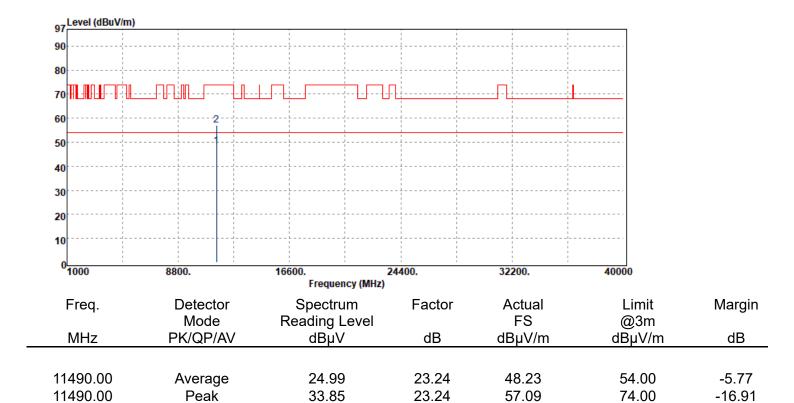
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5745 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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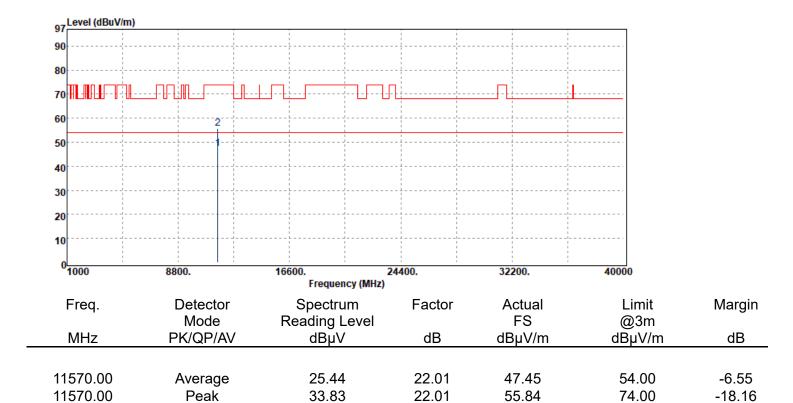
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-10

Test Frequency :5785 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :VERTICAL

EUT Pol :H Plane Engineer :Ricky



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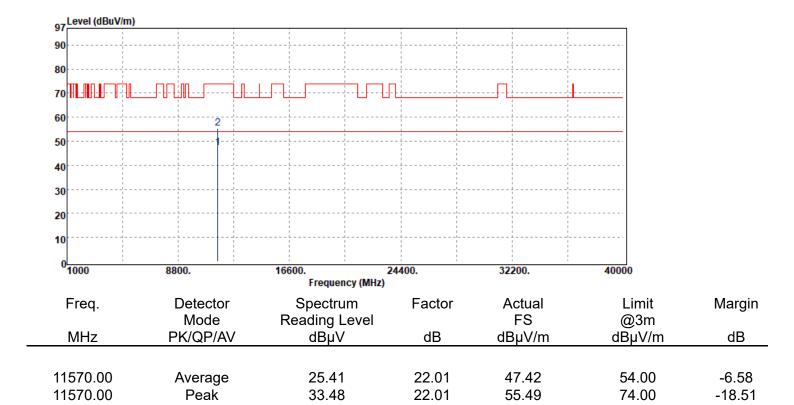
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5785 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH Mid Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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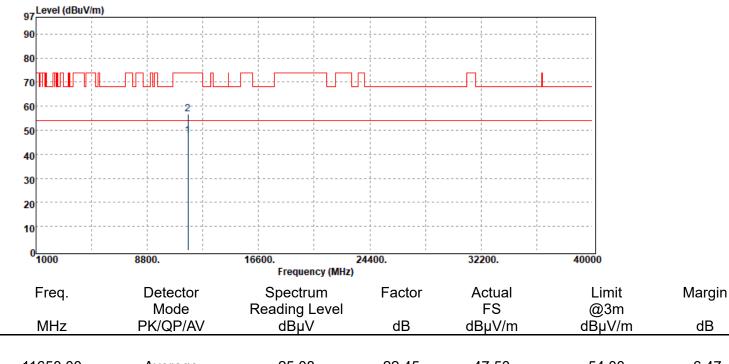
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5825 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



MHz	Mode PK/QP/AV	Reading Level dBµV	dB	FS dBµV/m	@3m dBµV/m	dB
11650.00	Average	25.08	22.45	47.53	54.00	-6.47
11650.00	Peak	34.32	22.45	56.77	74.00	-17.23

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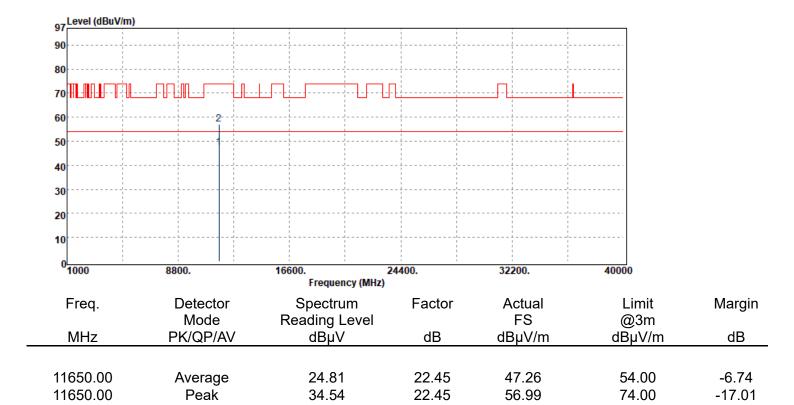
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-10 :802.11n20

**Test Frequency** :5825 MHz Temp./Humi. :25.8/60

Test Mode :Tx CH High Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



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## 11.7.3 Band edge falling to restricted band

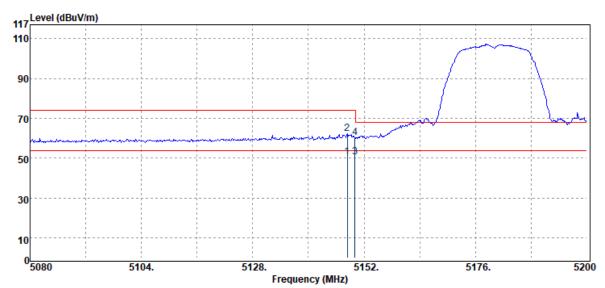
Report Number :ER-2020-80015 **Test Site** :SAC III Chamber

**Test Date Operation Mode** :802.11a :2020-08-07

Temp./Humi. **Test Frequency** :5180 MHz :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
5148.40	Average	41.95	8.68	50.63	54.00	-3.37
5148.40	Peak	53.60	8.68	62.28	74.00	-11.72
5150.00	Average	41.94	8.68	50.62	54.00	-3.38
5150.00	Peak	51.62	8.68	60.30	74.00	-13.70

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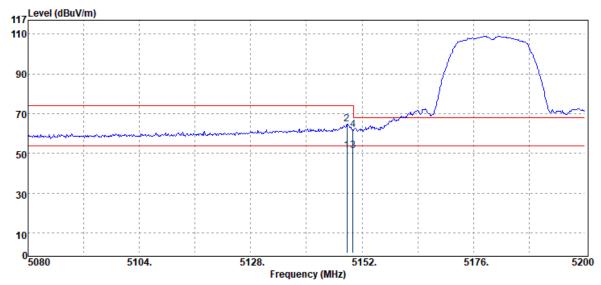
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-07

**Test Frequency** :5180 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin 
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
5148.76	Average	42.78	8.68	51.46	54.00	-2.54
5148.76	Peak	56.14	8.68	64.82	74.00	-9.18
5150.00	Average	42.84	8.68	51.52	54.00	-2.48
5150.00	Peak	53.41	8.68	62.09	74.00	-11.91

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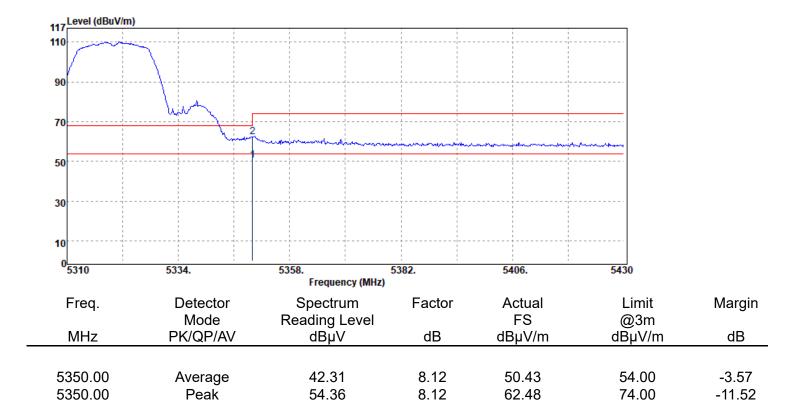
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11a

**Test Frequency** :5320 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

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Antenna Pol.

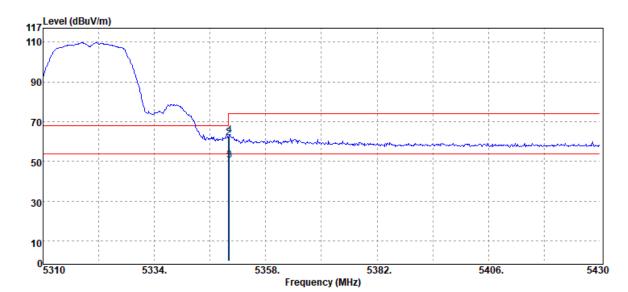
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-07

**Test Frequency** :5320 MHz Temp./Humi. :25.8/63

**EUT Pol** :H Plane Engineer :Ricky

:Bandedge CH High



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
5350.00	Average	42.26	8.12	50.38	54.00	-3.62
5350.00	Peak	53.95	8.12	62.07	74.00	-11.93
5350.20 5350.20	Average Peak	42.33 55.20	8.12 8.12	50.45 63.32	54.00 74.00	-3.55 -10.68

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Test Mode

Report No.: ER/2020/80015

:VERTICAL

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Antenna Pol.

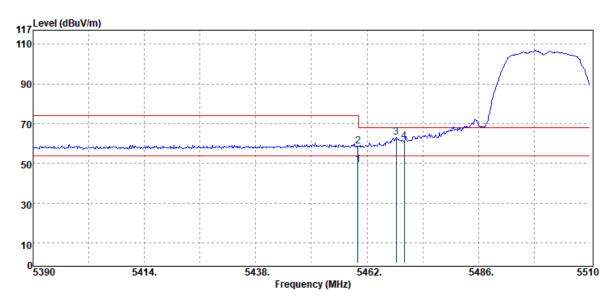
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-07

**Test Frequency** :5500 MHz Temp./Humi. :25.8/63

**EUT Pol** :H Plane Engineer :Ricky

:Bandedge CH Low



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
5460.00	Average	41.23	8.06	49.29	54.00	-4.71
5460.00	Peak	50.84	8.06	58.90	74.00	-15.10
5468.24	Peak	55.04	8.08	63.12	68.20	-5.08
5470.00	Peak	53.13	8.07	61.20	68.20	-7.00

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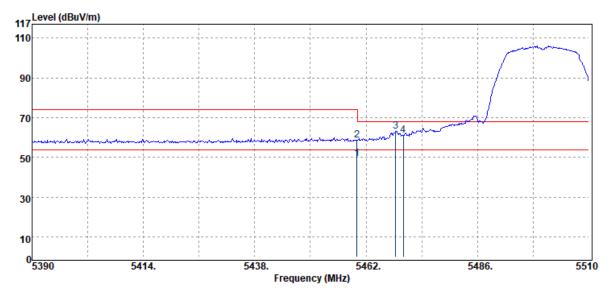
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-07

**Test Frequency** :5500 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBμV/m	Limit @3m dBµV/m	Margin dB
5460.00	Average	41.39	8.06	49.45	54.00	-4.55
5460.00	Average Peak	50.51	8.06	58.57	74.00	-4.55 -15.43
5468.36	Peak	55.21	8.08	63.29	68.20	-4.91
5470.00	Peak	53.17	8.07	61.24	68.20	-6.96

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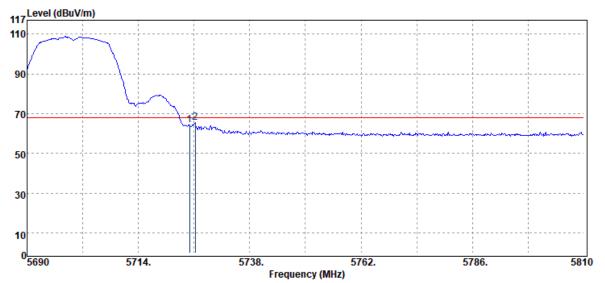
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Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-07

**Test Frequency** :5700 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :VERTICAL **EUT Pol** :H Plane Engineer :Ricky



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
 MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
						_
5725.00	Peak	55.58	8.81	64.39	68.20	-3.81
5726.24	Peak	56.92	8.81	65.73	68.20	-2.47

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Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

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Antenna Pol.

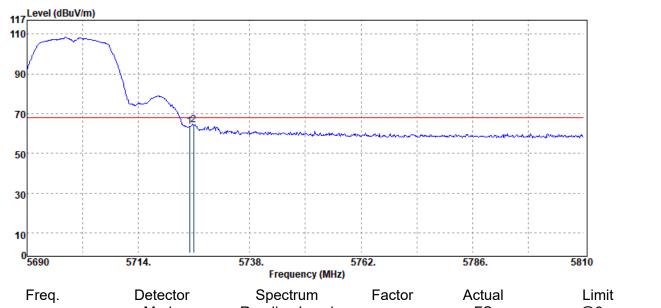
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11a Test Date :2020-08-07

Test Frequency :5700 MHz Temp./Humi. :25.8/63

EUT Pol :H Plane Engineer :Ricky

:Bandedge CH High



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dBμV	dB	dBµV/m	dΒμV/m	dB
						_
5725.00	Peak	54.95	8.81	63.76	68.20	-4.44
5725.88	Peak	55.74	8.81	64.55	68.20	-3.65

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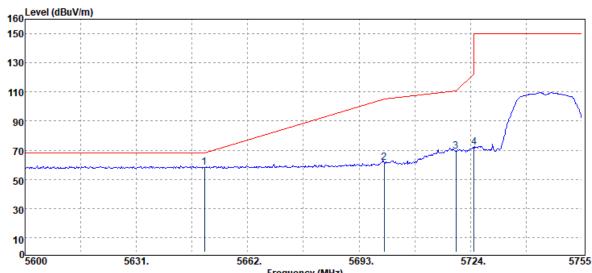
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11a

**Test Frequency** :5745 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



		Frequency (MHZ)				
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
5650.00	Peak	49.77	8.32	58.09	68.20	-10.11
5700.00	Peak	52.66	8.69	61.35	105.20	-43.85
5720.00	Peak	60.50	8.78	69.28	110.80	-41.52
5725.00	Peak	63.36	8.81	72.17	122.20	-50.03

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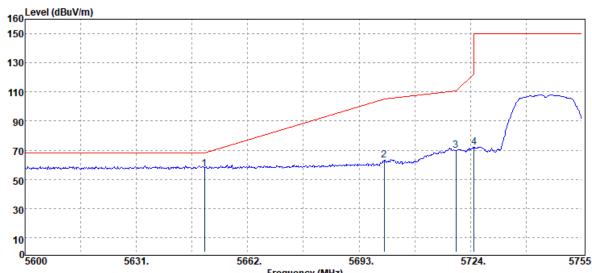
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11a

**Test Frequency** :5745 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



		Frequency (MHZ)				
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
						_
5650.00	Peak	48.95	8.32	57.27	68.20	-10.93
5700.00	Peak	54.35	8.69	63.04	105.20	-42.16
5720.00	Peak	60.97	8.78	69.75	110.80	-41.05
5725.00	Peak	63.05	8.81	71.86	122.20	-50.34

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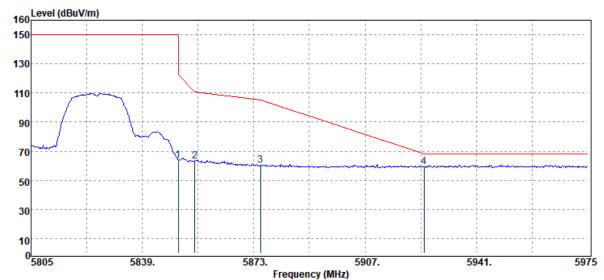
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11a **Test Date** :2020-08-07

**Test Frequency** :5825 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
5850.00	Peak	54.51	9.42	63.93	122.20	-58.27
5855.00	Peak	53.95	9.44	63.39	110.80	-47.41
5875.00	Peak	50.92	9.50	60.42	105.20	-44.78
5925.00	Peak	49.57	9.65	59.22	68.20	-8.98

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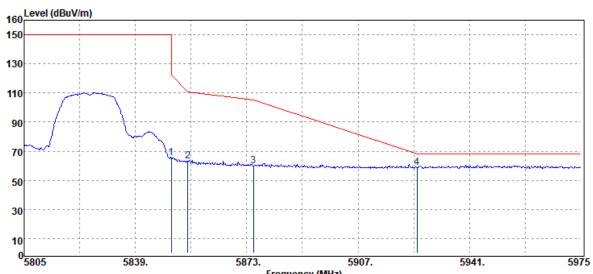
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11a

**Test Frequency** :5825 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



		Frequency (MHz)				
Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
5850.00	Peak	56.05	9.42	65.47	122.20	-56.73
5855.00	Peak	53.66	9.44	63.10	110.80	-47.70
5875.00	Peak	50.13	9.50	59.63	105.20	-45.57
5925.00	Peak	48.87	9.65	58.52	68.20	-9.68

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:H Plane

**EUT Pol** 

Report No.: ER/2020/80015

:Ricky

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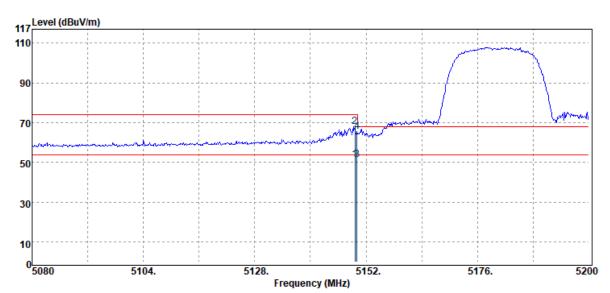
Engineer

Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5180 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :VERTICAL



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBμV/m	Limit @3m dBµV/m	Margin dB
5149.60	Average	42.85	8.68	51.53	54.00	-2.47
5149.60	Peak	59.20	8.68	67.88	74.00	-6.12
5150.00	Average	42.71	8.68	51.39	54.00	-2.61
5150.00	Peak	56.78	8.68	65.46	74.00	-8.54

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Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

Page: 113 of 128

Antenna Pol.

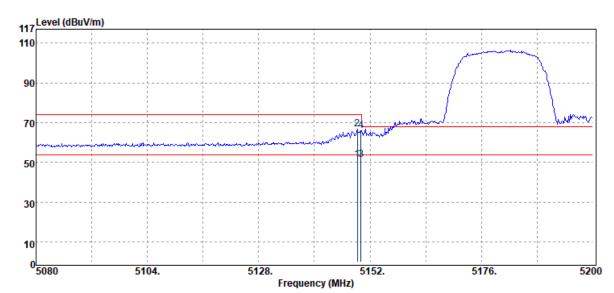
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11n20 **Test Date** :2020-08-07

**Test Frequency** :5180 MHz Temp./Humi. :25.8/63

**EUT Pol** :H Plane Engineer :Ricky

:Bandedge CH Low



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBμV/m	Limit @3m dBµV/m	Margin dB
		<u> </u>		-	<u>.</u>	
5149.24	Average	42.69	8.68	51.37	54.00	-2.63
5149.24	Peak	58.20	8.68	66.88	74.00	-7.12
5150.00	Average	42.93	8.68	51.61	54.00	-2.39
5150.00	Peak	57.19	8.68	65.87	74.00	-8.13

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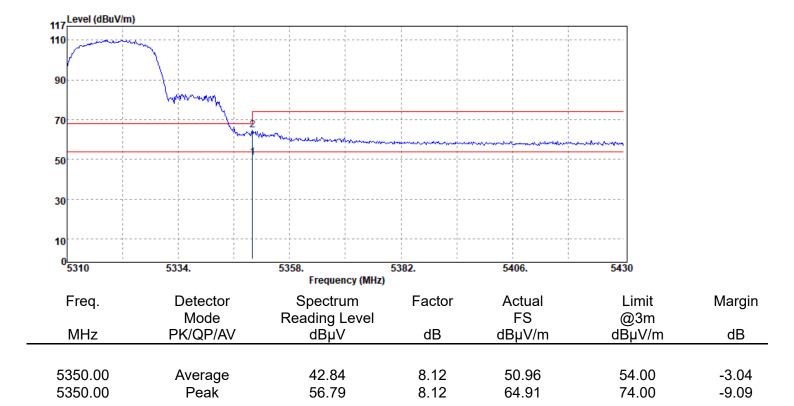
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5320 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

Page: 115 of 128

Antenna Pol.

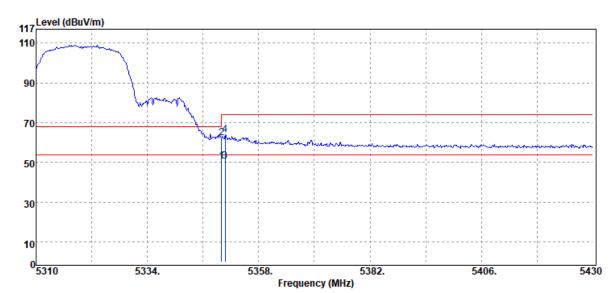
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11n20 **Test Date** :2020-08-07

**Test Frequency** :5320 MHz Temp./Humi. :25.8/63

**EUT Pol** :H Plane Engineer :Ricky

:Bandedge CH High



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dΒμV/m	Limit @3m dBµV/m	Margin dB
5350.00	Average	42.59	8.12	50.71	54.00	-3.29
5350.00	Peak	54.03	8.12	62.15	74.00	-11.85
5350.80	Average	42.58	8.12	50.70	54.00	-3.30
5350.80	Peak	55.93	8.12	64.05	74.00	-9.95

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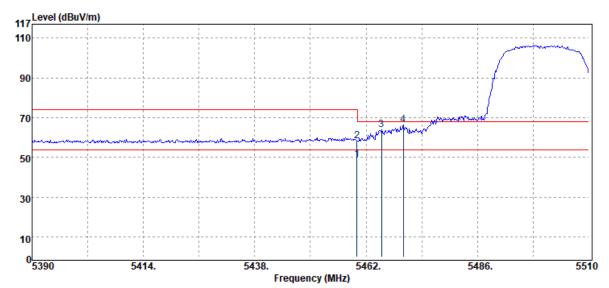
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11n20 **Test Date** :2020-08-07

**Test Frequency** :5500 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dΒμV/m	Limit @3m dBµV/m	Margin dB
5460.00	Average	41.03	8.06	49.09	54.00	-4.91
5460.00	Peak	50.26	8.06	58.32	74.00	-15.68
5465.36	Peak	56.01	8.07	64.08	68.20	-4.12
5470.00	Peak	58.37	8.07	66.44	68.20	-1.76

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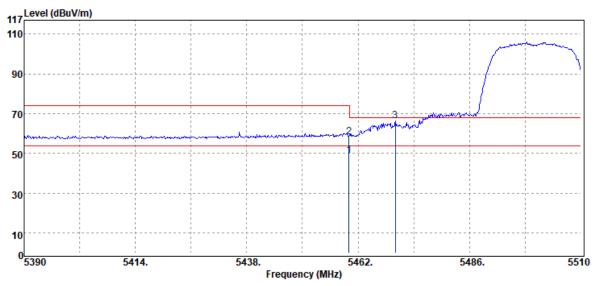
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode** :802.11n20 **Test Date** :2020-08-07

**Test Frequency** :5500 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dBµV/m	dB
						_
5460.00	Average	40.95	8.06	49.01	54.00	-4.99
5460.00	Peak	50.37	8.06	58.43	74.00	-15.57
5470.00	Peak	58.28	8.07	66.35	68.20	-1.85

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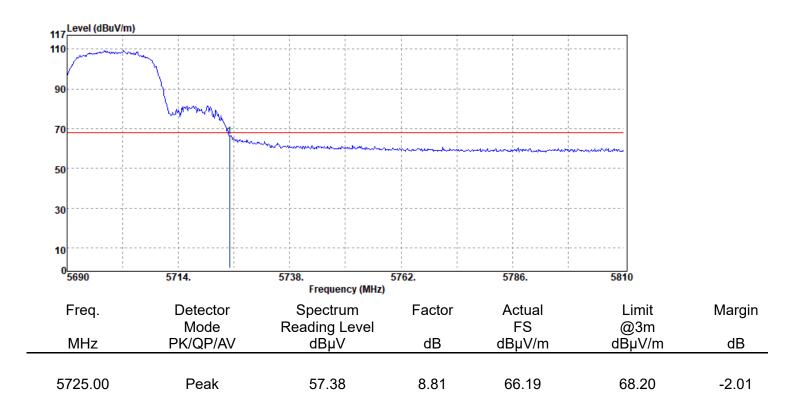
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5700 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



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Test Mode

Report No.: ER/2020/80015

:HORIZONTAL

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Antenna Pol.

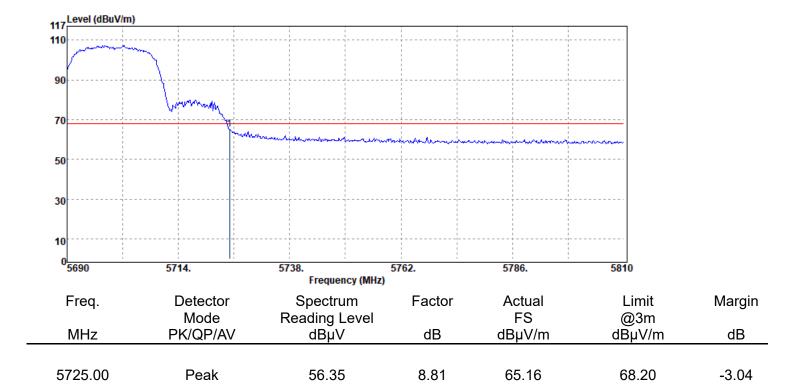
Report Number :ER-2020-80015 Test Site :SAC III Chamber

Operation Mode :802.11n20 Test Date :2020-08-07

Test Frequency :5700 MHz Temp./Humi. :25.8/63

EUT Pol :H Plane Engineer :Ricky

:Bandedge CH High



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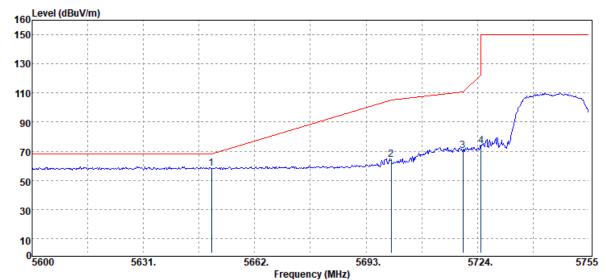
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5745 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBμV/m	dBμV/m	dB
5650.00	Peak	49.58	8.32	57.90	68.20	-10.30
5700.00	Peak	55.40	8.69	64.09	105.20	-41.11
5720.00	Peak	61.70	8.78	70.48	110.80	-40.32
5725.00	Peak	64.94	8.81	73.75	122.20	-48.45

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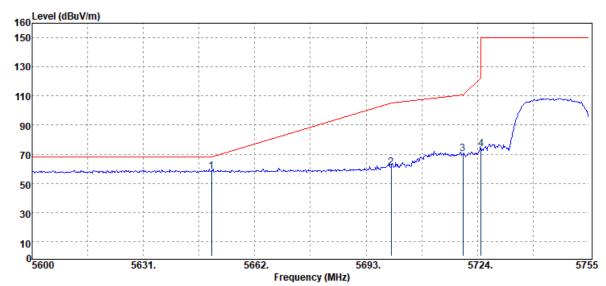
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5745 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH Low Antenna Pol. :HORIZONTAL

**EUT Pol** :H Plane Engineer :Ricky



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBμV/m	Limit @3m dBµV/m	Margin dB
5650.00	Peak	49.60	8.32	57.92	68.20	-10.28
5700.00	Peak	52.06	8.69	60.75	105.20	-44.45
5720.00	Peak	61.57	8.78	70.35	110.80	-40.45
5725.00	Peak	65.07	8.81	73.88	122.20	-48.32

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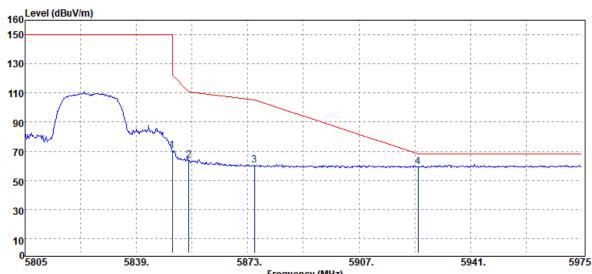
Report Number Test Site :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5825 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :VERTICAL

**EUT Pol** :H Plane Engineer :Ricky



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
						_
5850.00	Peak	60.89	9.42	70.31	122.20	-51.89
5855.00	Peak	54.25	9.44	63.69	110.80	-47.11
5875.00	Peak	50.91	9.50	60.41	105.20	-44.79
5925.00	Peak	49.75	9.65	59.40	68.20	-8.80

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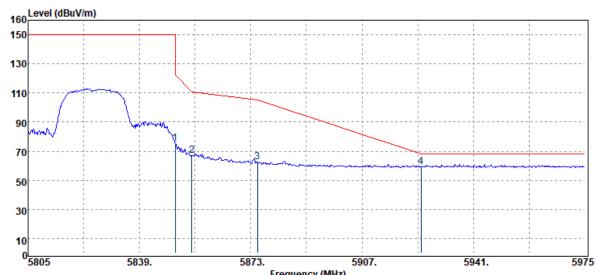
Report Number **Test Site** :SAC III Chamber :ER-2020-80015

**Operation Mode Test Date** :2020-08-07 :802.11n20

**Test Frequency** :5825 MHz Temp./Humi. :25.8/63

Test Mode :Bandedge CH High Antenna Pol. :HORIZONTAL

:Ricky **EUT Pol** :H Plane Engineer



Freq.	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
 MHz	PK/QP/AV	dΒμV	dB	dBµV/m	dΒμV/m	dB
						_
5850.00	Peak	65.77	9.42	75.19	122.20	-47.01
5855.00	Peak	57.52	9.44	66.96	110.80	-43.84
5875.00	Peak	53.13	9.50	62.63	105.20	-42.57
5925.00	Peak	49.78	9.65	59.43	68.20	-8.77

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### 12 TRANSMISSION IN THE ABSENCE OF DATA

## Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

### 12.2 Result

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ASK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

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# 13 FREQUENCY STABILITY

## Standard Applicable

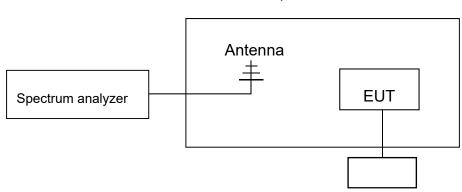
Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

#### 13.2 **Measurement Procedure**

- 1. The EUT was placed inside temperature chamber and powered and powered by nominal DC voltage.
- 2. Set EUT as normal operation.
- 3. Turn the EUT on and couple its output to spectrum.
- 4. Turn the EUT off and set the chamber to the highest temperature specified.
- 5. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT and measure the operating frequency.
- 6. Repeat step with the temperature chamber set to the lowest temperature.

#### **Test SET-UP** 13.3

### Temperature Chamber



Variable AC Power Supply

#### 13.4 **Measurement Equipment Used:**

SGS Conducted Room						
Name of Equip- ment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021	
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020	
Temperature Chamber	TERCHY	MHG-120LF	911009	05/20/2020	05/19/2021	
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021	
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021	

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### 13.5 **Measurement Result** Start up

Operation Mode	802.11 a	Test Date	2020/9/25
Temperature	:25.2 ℃	Test By	Thomas Wei
Humidity	: 52%		

Test Temp.(℃)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-20	5.5	36	5180	5,179.99104	0.00000173
-20	4.5	36	5180	5,180.00304	-0.00000059
25	5	36	5180	5,180.00835	-0.00000161
40	5.5	36	5180	5,180.00126	-0.00000024
40	4.5	36	5180	5,179.99284	0.00000138

### 2 minutes

Operation Mode	802.11 a	Test Date	2020/9/25
Temperature	:25.2 ℃	Test By	Thomas Wei
Humidity	: 52%		

Test Temp.(℃)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-20	5.5	36	5180	5,180.00054	-0.00000010
-20	4.5	36	5180	5,179.97503	0.00000482
25	5	36	5180	5,179.99068	0.00000180
40	5.5	36	5180	5,180.01334	-0.00000257
40	4.5	36	5180	5,180.00250	-0.00000048

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### 5 minutes

Operation Mode	802.11 a	Test Date	2020/9/25
Temperature	:25.2 <b>℃</b>	Test By	Thomas Wei
Humidity	: 52%	-	

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-20	5.5	36	5180	5,179.99144	0.00000165
-20	4.5	36	5180	5,179.98034	0.00000380
25	5	36	5180	5,179.99045	0.00000184
40	5.5	36	5180	5,180.00503	-0.00000097
40	4.5	36	5180	5,180.00159	-0.00000031

### 10 minutes

Operation Mode	802.11 a	Test Date	2020/9/25
Temperature	:25.2 ℃	Test By	Thomas Wei
Humidity	: 52%		

Test Temp.(°C)	Test Voltage(V)	Channel	Measured Frequency (MHz)	Spectrum Frequency (MHz)	ΔFrequency (MHz)
-20	5.5	36	5180	5,180.00016	-0.00000003
-20	4.5	36	5180	5,179.99156	0.00000163
25	5	36	5180	5,179.99003	0.00000193
40	5.5	36	5180	5,180.01089	-0.00000210
40	4.5	36	5180	5,180.00131	-0.00000025

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# 14 ANTENNA REQUIREMENT

## Standard Applicable

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

According to §15.407, If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 14.2 Antenna Connected Construction

The antenna is designed as permanently attached and no consideration of replacement. Please see EUT photo for details.

~ End of Report ~

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